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DEPARTMENT OF THE INTERIOR.

BULLETIN

OF

THE UNITED STATES

GEOLOGICAL AND GEOGRAPHICAL SURVEY

OF

THE TERRITORIES.

F. V. HAYDEN,
U. S. GEOLOGIST-IN-CHARGE.

1882.

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OXFORD

VOLUME VI.

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1882.

PREFATORY NOTE.

U. S. GEOLOGICAL AND GEOGRAPHICAL
SURVEY OF THE TERRITORIES,
Washington, July 31, 1882.

Bulletin No. 3 completes Volume VI and ends the series. With this number are issued index, title-page, table of contents, list of illustrations, &c., for the whole volume. The separately published numbers should be preserved for binding, as there is no issue of the Bulletins in bound volumes, and as back numbers cannot always be supplied to complete deficient files.

In issuing the final volume of Bulletins, a word regarding the origin and progress of this publication will not be out of place. The issue began in 1874, when it was found desirable to establish more ready means of communication with the public and with scientific bodies than the regular reports of the Survey afforded; the design being to publish, without the delay incident to the appearance of more elaborate and extended articles, such new or specially interesting matter as should be contributed to the general results of the explorations under my charge by the members or the collaborators of the Survey. The practical importance of prompt measures in such cases is well recognized, and sufficiently attested by the success which the Bulletins have achieved.

The First and Second Bulletins, which appeared in 1874, are separately paged pamphlets, without ostensible connection with each other or with subsequent ones, but together constituting a "First Series" of the publication. Bulletins which appeared in 1875, being those of a "Second Series" and six in number, are continuously paged. With No. 6 were issued title, contents, index, &c., for all the numbers of both "series" which had then appeared; the design being that these should together constitute Volume I, in order that the inconvenient distinction of "series" might be dropped.

With Bulletin No. 1 of 1876, the publication was established as an annual serial; the four consecutively paged numbers of that year constituting Volume II.

The four Bulletins of 1877 constitute Volume III.

The four Bulletins of 1878 form Volume IV.

The four Bulletins of 1879 and 1880 constitute Volume V, and Volume VI, which contains three numbers, issued during 1881 and 1882, closes the publication. It is to be regretted that Article I of No. 3 remains incomplete, owing to the unfortunate sickness of the author, Professor Allen, which prevents the continuation of the Bibliography of the Cetacea and Sirenia in the serial.

Volumes IV and V were issued under the supervision of Dr. Elliott Coues, U. S. A., and Volume VI was completed by W. H. Holmes.

F. V. HAYDEN,
United States Geologist.

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BULLETIN

OF THE

UNITED STATES GEOLOGICAL AND GEOGRAPHICAL SURVEY
OF THE TERRITORIES.

VOLUME VI. 1880. NUMBER 1.

Art. I.—The Vegetation of the Rocky Mountain Region and a Comparison with that of other Parts of the World.

By Asa Gray and Joseph D. Hooker.

I.

THE VEGETATION OF THE ROCKY MOUNTAIN REGION.

The vegetation of the wide central tract which lies between the Atlantic United States and those which border on the Pacific is replete with interest and importance, both scientific and economical. We are to sketch its general features, as made known to us by personal observation, by the published observations of others, and by the botanical studies to which we have been devoted. For doing this to much purpose, it is necessary to compare or to contrast the vegetation of the district in question with that of the more fertile regions on both sides, and with a somewhat similar wide interior district in another part of the northern temperate zone.

By "the Atlantic States," as contradistinguished from those of the Pacific, we here mean not only those which touch upon the Atlantic Ocean, but also those which border the Mississippi River, on its western as well as its eastern side; the great woodless plains being taken as their western limit. The term "Rocky Mountain Region," here used in its widest sense, and in the lack of a better appellation, we propose to apply in general in such wise as to include the gradually elevated plateau which flanks the eastern base of the Rocky Mountains on the one hand, and the equally elevated district or plateau, thickly traversed by mountain ranges, which extends westward to the eastern base of the Sierra Nevada of California, and the Cascade Mountains further north. As to the Rocky Mountains themselves, it is most convenient and natural, from our point of view, to comprise under this general designation all the ranges as far west as the Wahsatch inclusive.

We understand the term *Cordilleras*, brought into use by Professor

Whitney, to be a comprehensive appellation for the whole system of mountains, from the most eastern Rocky Mountains to the Sierra Nevada inclusive, and the continuation of the latter in the Cascade Mountains of Oregon and British Columbia. The region which we are to treat botanically might take the name of the Cordilleran Region of North America. But it will, on several accounts, be better to adhere in this essay to the designation used in our title. For, although the term "cordilleras" would be the only appropriate one if we had the whole vast mountain system in view, from Patagonia to the Arctic sea-coast, it is a term which belongs primarily and mainly to South America, and our survey is to embrace only a few parallels of latitude, in fact just those which contain the ranges which early took the name of the Rocky Mountains, both at the north, where they were traversed by Lewis and Clarke at the beginning of this century (1803–1806), and at the south, where they were reached on the frontiers of New Mexico by Pike a year or two later.

With these Rocky Mountains proper, *i. e.* the eastern and dominating ranges, as the central line of our field of view, the horizon should extend eastward to where the gradually subsiding plain becomes green with a rich prairie vegetation, to be at length fringed with forest, and westward to the base of the Sierra Nevada and the Cascades, the eastern verge of the Pacific forest region.

In a developed treatise, the physical geography and the climatic elements of the region would have to pass under review, and the multifarious and scattered botanical data would have to be collected, discussed, and tabulated. We cannot undertake an exhaustive task like this, nor could we add much to what has already been done in various well-considered and well-known government reports. The climatology and the practical considerations deducible from it form the subject of Major Powell's "Report on the Lands of the Arid Region of the United States," the second edition of which was issued in 1879. In the "General Report" which forms the introduction to the botanical volume of Clarence King's celebrated "Survey on the Fortieth Parallel" (and which prefaces that elaborate systematic treatise which was too modestly styled a "Catalogue," and so has by some been cited as such), Mr. Sereno Watson has thoroughly and ably discussed the elements of the flora of the Great Basin, exemplifying it with lists and other details. And for a district further south, Professor Rothrock, in his volume on the Botany of Wheeler's Surveys, has within the last year published his instructive notes on the characteristic features of the botany of Colorado, New Mexico, and a part of Arizona. Professor Sargent has given a useful sketch of the arboreal and frutescent vegetation of Nevada in the American Journal of Science for June, 1879; and among Professor Hayden's very important reports, that of Henry Gannett, "On the Arable and Pasture Lands of Colorado" (1875, reprinted in 1878), is noteworthy.

Our sketch must be, like our observations, a rapid and cursory reconnaissance, noting some features which arrested our attention, drawing some comparisons, and suggesting inferences which seem to us probable.

The phytogeography of the temperate portion of the North American continent, in broad outlines is evidently this: An Atlantic forest region; a Pacific forest region; and, between the two, the wide interior, mainly non-forest, region—the special subject of our essay; a region not easy to name nor to describe succinctly, but of which the eastern half is a vast woodless plain, gradually and evenly rising, so that its western margin is about 5,000 feet above the sea-level; then a mountain belt, the highest ridges and peaks of which rise from 11,000 to 14,400 feet; then, shut out from moisture by these mountains on the east and the Sierra on the west, an arid interior district of plains, at an average of 5,000 feet above the sea. This is mainly desert, and is traversed by many mountain ranges, generally of north and south direction, and reaching an elevation of 9,000 or 10,000 feet, or rarely higher. This whole interior, of miles average breadth—like other great interiors not very exceptionally favored—is marked by the scantiness or absence of arboreal vegetation and of rainfall, the former being in great measure dependent on the latter. Its plains are treeless except along water-courses; the mountains bear trees along sheltered ravines and on their higher slopes, upon which there is considerable condensation of moisture; but, whenever they rise to a certain height (about 11,000 feet in latitude 37° to 41°), they are woodless from cold and other hardship attending elevation, although they enjoy an abundant condensation of moisture, mostly in the form of snow.

The Rocky Mountain region may be therefore divided vertically into three botanical districts:

1. An arid and woodless district, which occupies far the greater part of the area.

2. A wooded district, in some places covering, in others locally adorning, the mountain slopes.

3. An alpine unwooded district above the belt where trees exist. But in some places, slopes woodless from dryness merge into tracts woodless from cold, no proper forest belt intervening.

These three botanical districts may be separately investigated.

The smallest in area—since it is restricted to mountain summits and the least peculiar, is—

I.—The Alpine Region.

Botanically the alpine regions of the temperate zone in the northern hemisphere are southward prolongations of arctic vegetation, almost pure in the boreal parts, but more and more mixed with special types in lower latitudes, these special types being a part of the flora which is characteristic of each continent in those latitudes.

Leaving out of view a considerable number of temperate species which here and there become alpestrine or persist in dwarfed forms within some truly alpine regions, the alpine flora of the United States does not comprise a large number of species. It may be useful to present a tabulated list of them, *i. e.*, of the phænogamous portion, under three heads, placing the ampler Rocky Mountain alpine flora in the center and the more restricted Atlantic and Pacific alpine floras one on each side.

It will be understood that the survey is limited to the United States proper, reaching latitude 47° on the Atlantic and 49° 40′ on the Pacific side, in all of which the proper alpine flora is confined to high altitudes, from about 5,000 to over 14,000 feet above the sea-level. On the Atlantic side it is only a matter of a few isolated summits in New England and Northern New York, the Alleghanian or Apalachian chain and its dependencies not being high enough in New York and Pennsylvania, and being in too low latitude notwithstanding their greater elevation in the Carolinas, to have more than alpestrine vegetation, although a few properly alpine species linger on the summits. On the Pacific side we have to do only with the Sierra Nevada and its northern prolongation; and there, too, we make latitude 47° the northern limit, because north of that parallel, we cannot at present well determine the limit between what belongs to the Rocky Mountains and what to the continuation of the Cascade Mountains.

The species which are not arctic are distinguished by italic type; when the genera are peculiar to the region, the generic name is printed in small capitals. To save space in the columns, the names are printed without reference to authorship.

The left-hand column is so insignificant, that it might have been omitted. We cannot amplify it by adding alpine plants from farther north, such as the stragglers about the Gulf of Saint Lawrence and the Labrador flora, for these are found nearly at the sea-level and are extensions of the proper arctic flora.

Atlantic United States Alpine.	Rocky Mountain Alpine.	Pacific United States Alpine.
	Thalictrum alpinum.	
	Anemone narcissiflora.	Anemone narcissiflora.
		Anemone occidentalis (A. Baldensis Hook).
	Ranunculus Eschscholtzii.	*Ranunculus Eschscholtzii.*
	Ranunculus pygmæus.	Ranunculus pygmæus.
	Ranunculus adoneus.	
	Ranunculus Macauleyi.	
		Ranunculus oxynotus.
	Papaver alpinum (nudicaule).	Papaver alpinum (nudicaule).
	Parrya macrocarpa.	Parrya macrocarpa.
Cardamine bellidifolia.	Cardamine bellidifolia.	Cardamine bellidifolia.
	Draba aurea.	*Draba aurea.*
	Draba alpina.	Draba alpina.
	Draba hirta or arctica.	
	Draba crassifolia.	*Draba crassifolia.*
	Draba stellata or muricella.	Draba stellata or muricella.
	Draba ventosa.	*Draba eurycarpa.*
		Draba Douglasii.
		Draba ......

Atlantic United States Alpine.	Rocky Mountain Alpine.	Pacific United States Alpine.
	Smelowskia calycina.	Smelowskia calycina.
	Thlaspi alpestre.	Thlaspi alpestre.
	Lychnis (Melandrium) Kingii.	
		Lychnis (Mel.) Californica.
Silene acaulis.	Silene acaulis.	Silene acaulis.
	Cerastium alpinum.	Cerastium alpinum.
Arenaria Grœnlandica.		
Arenaria verna or vars.	Arenaria verna or vars.	Arenaria verna or vars.
	Arenaria Rossii.	
	Arenaria biflora.	Arenaria biflora.
	Arenaria arctica.	Arenaria arctica.
	Sagina nivalis.	
	Claytonia arctica, megarrhiza.	
	Calandrinia pygmæa.	*Calandrinia pygmæa.*
	Trifolium nanum.	
	Trifolium andinum.	
	Trifolium dasyphyllum.	
	Trifolium Parryi.	
	Astragalus calycosus.	
Astragalus alpinus.	Astragalus alpinus.	Astragalus alpinus.
	Oxytropis podocarpa.	
	Oxytropis Uralensis, arctica.	
	Oxytropis nana.	
	Oxytropis multiceps.	
		Eriogynia pectinata.
Rubus Chamæmorus.	Rubus Chamæmorus.	
	Rubus arcticus.	Rubus arcticus.
Dryas octopetala?	Dryas octopetala and var.	Dryas octopetala.
	Geum Rossii.	
Geum radiatum, Peckii.		
Potentilla frigida.	Potentilla frigida?	
		Potentilla gelida.
		Potentilla Breweri.
	Potentilla diversifolia.	*Potentilla diversifolia.*
	Potentilla nivea.	
		Potentilla villosa.
	IVESIA *Gordoni.*	IVESIA *Gordoni.*
		IVESIA *Muirii.*
Sibbaldia procumbens.	Sibbaldia procumbens.	Sibbaldia procumbens.
	Saxifraga adscendens.	
	Saxifraga Jamesii.	
Saxifraga rivularis.	Saxifraga rivularis.	Saxifraga rivularis.
	Saxifraga debilis.	
	Saxifraga cernua.	Saxifraga cernua.
	Saxifraga Hirculus.	
	Saxifraga chrysantha.	
		Saxifraga Tolmiei.
Saxifraga stellaris.	Saxifraga stellaris.	Saxifraga stellaris.
		Saxifraga bryophora.
	Saxifraga punctata.	Saxifraga punctata.
	Saxifraga Dahurica.	Saxifraga Dahurica.
	Saxifraga nivalis.	Saxifraga nivalis.
	Saxifraga cæspitosa.	Saxifraga cæspitosa.
	Saxifraga bronchialis.	Saxifraga bronchialis.
	Saxifraga tricuspidata.	
	Saxifraga flagellaris.	Saxifraga flagellaris.
Saxifraga oppositifolia.	Saxifraga oppositifolia.	Saxifraga oppositifolia.
	Chrysosplenium alternifolium.	Chrysosplenium alternifolium.
Sedum Rhodiola.	Sedum Rhodiola.	Sedum Rhodiola.
	Sedum rhodanthum.	
	Epilobium latifolium.	Epilobium latifolium.
		Epilobium obcordatum.
	CYMOPTERUS *alpinus.*	
	CYMOPTERUS *nivalis.*	CYMOPTERUS *cinerascens.*
		CYMOPTERUS *Nevadensis.*
	APLOPAPPUS *pygmæus.*	
	APLOPAPPUS *Lyallii.*	*Aplopaoppus Lyallii.*
Solidago humilis, var. alpina.	Solidago humilis, var. alpina.	
	TOWNSENDIA *condensata.*	
	TOWNSENDIA *Rothrockii.*	
	Aster andinus.	
	Aster alpinus.	
(Greenland.)		*Erigeron compositum.*
	Erigeron uniflorum.	Erigeron uniflorum.
	Erigeron grandiflorum.	
	Erigeron ursinum.	*Erigeron ursinum.*
	Erigeron radicatum.	
	Antennaria alpina.	Antennaria alpina.
Gnaphalium supinum.		
	ACTINELLA *grandiflora.*	
	ACTINELLA *Brandegei.*	
	HULSEA *algida.*	
	HULSEA *nana.*	

Atlantic United States Alpine.	Rocky Mountain Alpine.	Pacific United States Alpine.
Artemisia borealis, L. Sup.	Artemisia borealis.	
	Artemisia scopulorum.	
	Artemisia arctica.	Artemisia arctica.
	Senecio Fremonti.	*Senecio Fremonti.*
	Senecio amplectens.	
	Senecio Soldanella.	
	Crepis nana.	Crepis nana.
	Hieracium triste.	*Hieracium triste.*
NABALUS *nanus.*		
NABALUS *Boottii.*	Taraxacum lævigatum.	
	Campanula uniflora.	
Vaccinium cæspitosum.	*Vaccinium cæspitosum.*	*Vaccinium cæspitosum.*
Arctostaphylos alpina.	Arctostaphylos alpina.	
Cassiope hypnoides.		
	Cassiope tetragona.	Cassiope tetragona.
	Cassiope Mertensiana.	*Cassiope Mertensiana.*
		Cassiope lycopodioides.
		Bryanthus Breweri.
	Bryanthus empetriformis.	*Bryanthus empetriformis.*
Bryanthus taxifolius.		
	Bryanthus glanduliflorus.	*Bryanthus glanduliflorus.*
Rhododendron Lapponicum.	Rhododendron Lapponicum.	
Loiseleuria procumbens.		
Diapensia Lapponica.		
	Primula angustifolia.	*Primula angustifolia.*
	Primula Parryi.	
		Primula suffrutescens.
	Douglasia nivalis.	
	Douglasia montana.	
	Androsace Chamæjasme.	Androsace Chamæjasme.
	Gentiana barbellata.	
	Gentiana tenella.	
	Gentiana propinqua.	
	Gentiana arctophila.	
	Gentiana prostrata.	
	Gentiana glauca.	
	Gentiana frigida.	
		Gentiana Newberryi.
	Gentiana Parryi.	
	Phlox bryoides.	
	Phlox muscoides.	
	Phlox cæspitosa.	*Phlox cæspitosa.*
	GILIA *Brandegei.*	
	Polemonium confertum.	*Polemonium confertum.*
	Polemonium viscosum.	
	Polemonium humile.	Polemonium humile.
	Eritrichium nanum.	Eritrichium nanum.
	Mertensia alpina.	
	CHIONOPHILA *Jamesii.*	
	SYNTHYRIS *alpina.*	
Veronica alpina.	Veronica alpina.	Veronica alpina.
Castilleia pallida, var sept.	Castilleia pallida, var. sept.	Castilleia pallida, var.
	Castelleia breviflora.	
Euphrasia officinalis (gracilis).	Euphrasia officinalis (gracilis).	
	Pedicularis Grœnlandica.	*Pedicularis Grœnlandica.*
	Pedicularis Parryi.	
		Pedicularis ornithorrhyncha.
	Pedicularis scopulorum.	
	Pedicularis flammea.	
	Paronychia pulvinata.	
	Eriogonum androsaceum.	
		Eriogonum incanum.
		Eriogonum Lobbii.
		Eriogonum pyrolæfolium.
	Eriogonum Kingii.	
	Koenigia Islandica.	
Oxyria digyna.	Oxyria digyna.	Oxyria digyna.
		Polygonum Shastense.
Polygonum viviparum.	Polygonum viviparum.	Polygonum viviparum.
	Polygonum minimum.	
	Salix arctica, var.	Salix arctica, var.
	Salix reticulata.	Salix reticulata.
	Salix phlelophylla.	*Salix phlelophylla.*
Salix herbacea.		
Salix Uva-Ursi?		
Empetrum nigrum.		
Habenaria obtusata.	*Habenaria obtusata.*	
	Tofieldia palustris.	
	Tofieldia coccinea.	
	Lloydia sentina.	Lloydia sentina.
Luzula spicata.	Luzula spicata.	Luzula spicata.
Luzula arcuata.	Luzula arcuata.	Luzula arcuata.

Atlantic United States Alpine.	Rocky Mountain Alpine.	Pacific United States Alpine.
Juncus trifidus.		
	Juncus triglumis.	
	Juncus biglumis.	
	Juncus Parryi.	*Juncus Parryi.*
	Juncus Drummondi.	*Juncus Drummondii.*
	Juncus castaneus.	Juncus castaneus.
		Juncus chlorocephalus.
	Kobresia scirpina.	
	Kobresia caricina.	
	Carex Pyrenaica.	Carex Pyrenaica.
	Carex nigricans.	Carex nigricans.
Carex scirpoidea.	*Carex scirpoidea.*	*Carex scirpoidea.*
	Carex obtusata.	
	Carex Lyoni.	
Carex capitata.	Carex capitata.	
		Carex Breweri.
	Carex incurva.	
Carex atrata.	Carex atrata.	Carex atrata.
Carex alpina.	Carex alpina.	
	Carex fuliginosa.	
	Carex frigida.	
	Carex fœtida.	Carex fœtida.
	Carex lagopina.	Carex lagopina.
Carex rigida.	Carex rigida.	
Carex rariflora.	Carex rariflora.	
	Carex podocarpa.	Carex podocarpa.
Carex capillaris.	Carex capillaris.	
	Carex filifolia.	*Carex filifolia.*
	Carex concinna.	
		Carex luzulæfolia.
	Alopecurus alpinus.	
Phleum alpinum.	Phleum alpinum.	Phleum alpinum.
	Agrostis rubra, etc.	
Calamagrostis Pickeringii.		
Hierochloa alpina.	Hierochloa alpina.	
Trisetum subspicatum.	Trisetum subspicatum.	Trisetum subspicatum.
Aiva atropurpurea.		
Poa laxa.	Poa laxa.	
	Poa arctica.	
Poa alpina.	Poa alpina.	Poa alpina.
	Festuca brevifolia or rubra.	Festuca brevifolia or rubra.
52 sp.	184 sp.	111 sp.

The analysis of this alpine flora need not detain us. The botanist sees at a glance that it is the arctic flora, or rather prolongations of it, extended southward along the mountains of sufficient elevation, with certain admixtures of types pertaining to the vegetation of the regions.

The peculiar elements in the scanty alpine flora of the Eastern United States are only five species, viz: One grass of arctic affinity, *Calamagrostis Pickeringii;* an orchid, *Habenaria obtusata;* a *Geum*, which has its principal home on the subalpine summits of the Alleghanies farther south, and is nearly represented by a species on the Northern Pacific coast; and two species of *Nabalus*, which will be allowed to be altered states of species peculiar to North America and nearly peculiar to the Atlantic side.

The Pacific alpine flora has a higher proportional number of non-arctic species, as must needs be, considering its long stretch through so many parallels of latitude; but the number pertaining to non-arctic genera is small. They are—

Calandrinia pygmæa.	*Cymopterus*, 2 species.
Eriogynia pectinata.	*Aplopappus Lyallii.*
Ivesia, 2 species.	*Eriogonum*, 3 species.

All of them are of genera peculiar to America. Besides these, only 38 species are peculiar to America, and between a third and a quarter of these are known to extend to Arctic America. Of the whole 111 species about 50 are not known in Europe and Asia in identical species.

The list of Rocky Mountain alpine species reaches the number of 184.

Those of the Sierra in California, and northward up to the British boundary, to 111.

Those of the mountains in the northeastern part of the Atlantic States (the Alleghanies, though reaching a greater altitude, are not high enough for the latitude to have any alpine vegetation, though they verge on it) are only 52.

The comparative meagerness of this last list is not surprising when we consider how very restricted the alpine area altogether is in Maine, New Hampshire (which has most of it), and the northeastern corner of New York. And we have not taken into account the arctic-alpine species which descend to the sea-level on the shores of the Gulf of Saint Lawrence, nor the few which occur on the bleak northern shore of Lake Superior. The latter, as some one has well suggested, owe their existence or continuance there neither to the absolute elevation nor to the latitude, but to the moist bleakness of a wind-swept coast, which gives them congenial summer conditions, on ground which forest cannot stand upon, owing to the severe exposure. Yet this forest resumes its sway northward, as soon as some shelter is given.

The Pacific alpine region, notwithstanding its long stretch along the mountain tops of a continuous but narrow north and south range, is also a restricted one. In California only the very culminations of the Sierra Nevada can be said to be alpine, and they are too arid in summer for the development of a true alpine flora. In Oregon and Washington Territory there is equal height under more northern parallels of latitude, abiding snow, and summer rain. The botany of these heights is far from well known. Probably all the arctic species of the Rocky Mountain column also belong there, and a fair share of exclusive species.

It is difficult to say what are or are not alpine species in the Sierra Nevada, especially southward, where, notwithstanding the heavy winter fall of snow, the higher elevations are unwooded from dryness as much as from cold. But, as we have excluded species which show themselves to be at home at lower altitudes, and have included all arctic-alpine types, the number of questionable character is very small.

Nor, except that we know their ranges and aptitudes better, is there much less difficulty in drawing a line between truly alpine and alpestrine species in the other regions. There are a goodly number of species which are normal to low altitudes or to the sea-level in the northern temperate zone, such as *Campanula rotundifolia*, *Taraxacum Dens-leonis*, *Androsace septentrionalis*, *Eriophorum alpinum*, *polystachyon*, &c., and *Festuca ovina*, which also flourish in an alpine station. And, indeed, these same species, and others like them (such as *Erigeron compositum*, which flourishes at the base as well as on the highest summits of the Rocky Mountains, and also in Greenland), make a part of the extreme arctic flora. Any list will therefore be to some extent arbitrary. For example, in the Atlantic alpine list, while *Cardamine bellidifolia*, *Silene acaulis*, *Sibbaldia procumbens*, *Gnaphalium supinum*, *Rhododendron Lapponicum*, *Diapensia Lapponica*, and the like, are strictly and exclusively alpine, *Arenaria Grœnlandica* and *Geum radiatum* (*Peckii*) are included for reasons which any botanist who has ascended these mountains will appreciate, although a form of the *Arenaria* sparingly occurs at low levels in Southern New England and New York, and both on the tops of the higher Alleghanies, where no characteristically alpine species accompany them, and where such summits as are bare of trees are not woodless on account of cold or any other incident of mere elevation.

Notwithstanding the geographical extent of the country over which it is spread, the North American alpine flora is meagre in species compared with that of Europe. This will abundantly appear in the comparison to be made in another part of this report. Reasons connected with geographical configuration and climate will account for this, but it must also be remembered that the botany of the European Alps is thoroughly known; that of the Rocky and other western mountains quite imperfectly so.

II.—THE FOREST REGION.

1. *Its trees.*

The most conspicuous portion of the vegetation of a country, and the most important under more than one point of view, is its trees. Their importance is most manifest in the district under consideration, where less than a quarter of the area is capable of producing them, and of which, owing to fires and other causes, only about half of what Major Powell designates as "timber regions" are actually covered with forest. Toward the north the case is more or less altered, especially in British America, where, in a wide tract with moderately abundant and well distributed rainfall, and summers not excessively warm, the Atlantic and Pacific forests join and intermingle. Southward, and indeed nearly up to the northern boundary of the United States, trees are borne only on the mountains and high plateaux, and along the immediate banks of streams descending from these.

The species of the whole Rocky Mountain region (taken in the widest extent) which may claim the name of trees—even of tree-like shrubs—are not long to enumerate.[*] They are these:

Sapindus marginatus, Willd.
Acer grandidentatum, Nutt.
Negundo aceroides, Moench.
Morus microphylla, Buckley.
Populus angustifolia, James.
Populus balsamifera, L.

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[*] We are much aided in this account by Prof. C. S. Sargent's article on The Forests of Central Nevada, in Amer. Journ. Sci., ser. 3, xvii, June, 1879, and by his Catalogue of the Forest Trees of North America, 1880, printed by the United States Census Bureau.

Olneya Tesota, Gray.
Parkinsonia Torreyana, Watson.
Prosopis juliflora, DC.
Prosopis pubescens, Benth.
Acacia Greggii, Gray.
Prunus Pennsylvanica, L.
Cercocarpus ledifolius, Nutt.
Pyrus sambucifolia, Cham. & Schl.
Cratægus—near *rivularis*, Nutt.
Amelanchier alnifolia, Nutt.
Cereus giganteus, Engelm.
Sambucus glauca, Nutt.
Arbutus Menziesii, Pursh, var.
Fraxinus anomala, Torr.
Fraxinus pistaciæfolia, Torr.
Fraxinus viridis, Michx., f.
Chilopsis saligna, Don.
Platanus Wrightii, Watson.
Juglans Californica, Watson.
Juglans rupestris, Engelm.
Quercus Emoryi, Torr.
Quercus hypoleuca, Engelm.
Quercus undulata, Torr.
Betula occidentalis, Hook.
Populus Fremontii, Watson.
Populus monilifera, Ait.
Populus tremuloides, Michx.
Populus trichocarpa, Torr. & Gray.
Juniperus occidentalis, Hook.
Juniperus Californica, Carr.
Juniperus Virginiana, L.
Juniperus pachyphlœa, Torr.
Abies concolor, Lindl.
Abies subalpina, Engelm.
Pseudotsuga Douglasii, Carr.
Picea Engelmanni, Engelm.
Picea pungens, Engelm.
Larix occidentalis, Nutt.
Pinus edulis, Engelm.
Pinus flexilis, James.
Pinus aristata, Engelm.
Pinus Chihuahuana, Engelm.
Pinus contorta, var. *Murrayana*, Eng.
Pinus monophylla, Torr.
Pinus ponderosa, Dougl., var. *scopulorum*, Engelm.
Pinus Arizonica, Engelm.
Yucca brevifolia, Engelm.

This mere botanical enumeration of about fifty species of trees, or at least arborescent plants, gives no proper idea of the arboreal flora as it presents itself to the view of a botanical traveler. It includes all the trees we know to inhabit any part of a vast tract, extending from the eastern base of the Rocky Mountains to the eastern base of the Sierra Nevada and Cascade ranges, and from the Mexican boundary, in latitude 32°, to the northern limit of forest, in about latitude 56°. The characters of the flora at the two extremes are most widely different. There is a far greater development of forest in the northern part, but it consists of the fewest species; and to the southern portion an undue appearance of richness is given to a very scanty sylva—first, by the enumeration of so many species which are only *arbusculæ* in their best estate, and are commonly mere shrubs; second, by including species which belong only or mainly to the Mexican frontier region—to the southern part of Arizona and New Mexico.

Of the latter sort are *Yucca brevifolia*, the only monocotyledonous arborescent species (tree it cannot well be called); the giant Cactus, *Cereus giganteus*, of the Lower Gila district; *Pinus Chihuahuana* and *P. Arizonica*, which barely cross the Mexican line; *Sapindus marginatus*, *Arbutus Menziesii*, or what seems to be a mere geographical variety of the Californian Madroña, which is not uncommon in Mexico, and which reaches Southwestern Texas; *Fraxinus anomala* and *F. pistaciæfolia*, *Platanus Wrightii*, &c., *Quercus Emoryi* and *Q. hypoleuca*, &c. Along with these, as equally foreign to the timber region of the Rocky Mountains and the accessory ranges, we should eliminate and place by themselves those trees which are characteristic of the southern arid plains, rather than of the mountains. A few of these come into Utah and Nevada, but they mostly belong to Arizona, and to a district, which, with all its aridity, receives a portion of the subtropical summer rainfall. To this category belong—

Olneya Tesota, a peculiar genus of papilionaceous *Leguminosæ*.

Parkinsonia Torreyana, the Palo Verde (*Cercidium* of authors).

Prosopis juliflora, the true Mesquite, and *P. pubescens*, the Screw Bean or Screw-pod Mesquite, the pods and seeds of which furnish food and forage, the bark a kind of gum-arabic, and the wood good fuel.

Acacia Greggii, the only one which in this district becomes aborescent.

Chilopsis saligna, the Desert Willow, fringing water-courses in the arid district.

Morus microphylla, a Texas Mulberry which extends along the southern part of New Mexico and Arizona.

It might be expected that a fair number of trees represented in the moister and cooler district of the Northern Rocky Mountains would disappear from the scantier, interrupted or scattered or restricted woods of the southern mountains; but we miss from them only one of the northern trees above enumerated, namely, the Larch of the region, *Larix occidentalis*, while we miss from the northern mountains no small number of those in the southern.

This is not the place to institute a comparison between the Rocky Mountain forest and the eastern; but it may be remarked that, while angiospermous, round-headed, and deciduous-leaved trees prevail in the latter, largely in the number of species and genera and conspicuously in the extent of surface occupied, the Rocky Mountain sylva, in its characteristic features, is gymnospermous, spiry, and evergreen. In the importance of its useful products, such as lumber, the difference between the two sorts, as a whole, in the Atlantic forest cannot be great. But with perhaps only one exception, that of the so-called Mountain Mahogany, *Cercocarpus ledifolius* (a small tree or more commonly a shrub), the economical value of the Rocky Mountain forest is almost wholly in its coniferous trees, and in the mountains these alone strike the eye.

Disregarding unessential and inconspicuous features, and eliminating those outlying small trees of the Mexican border, we may say that the Rocky Mountain forest is composed of the following species, which are arranged somewhat in the order of their conspicuousness and importance:

Pinus ponderosa, called Yellow Pine, and sometimes Long-leaved Pine, which distinguishes it well from the next. It is a composite species, and the form of it which we are concerned with, and to which Engelmann assigns the name of *scopulorum* (*i. e.*, the Rocky Mountain variety), is the one to which the term "long-leaved" least applies. It is one of the largest trees of the proper Rocky Mountains, along which it ranges from latitude 51°, according to Dr. G. M. Dawson, to New Mexico, is rare on any of the ranges which traverse the Nevada desert, and takes its fullest development and predominance in California and Oregon, extending also into the central dry region of British Columbia. It becomes a large tree even on the interior mountains, in the southern part mostly on slopes between 7,000 and 9,000 feet above the level of the sea, in the most northern ceasing at three to four thousand. Its heavy and coarse-grained lumber is suitable for the ruder building and the mining purposes to which it is devoted.

Pinus contorta, singularly called *Tamarack* in California, but in British Columbia Bull or Black Pine, and in Utah Red Pine, is also a rather composite species, one of equally great geographical range, but in higher altitudes and latitude than the preceding. It replaces it on the mountains of Colorado at between eight or nine and ten or eleven thousand feet; is naturally absent from the Nevada and most of the Utah ranges: in British Columbia, according to young Dr. Dawson, "it is the characteristic tree over the northern part of the interior plateau, and densely covers great areas. In the southern part of the province it is found only on those parts of the plateau which rise above about 3,500 feet, where the rainfall becomes too great for the healthy growth of *P. ponderosa*. It grows also abundantly on sandy beaches and river flats at less elevations." Loving moisture and coolness, it is also a coast species even as far south as Mendocino County, California, whence it extends to the Yukon River, in latitude 63°. Northeastward it gets beyond the Rocky Mountains, in latitude 56°, and is replaced by the Banksian Pine "at the watershed between the Athabasca and Saskatchewan." The wood is white and light (so that the tree is sometimes called Spruce or White Pine), but fairly durable; but the tree never attains a great girth. In Loudon's Encyclopædia of Trees and Shrubs, where this species is first published on Douglas's specimens, it is named in English "The Twisted-branched Pine." Douglas is thought to have given the name in reference to the dead and denudated slender lower branches, which persist for a long while and curve downward and inward, but do not twist; at least this is the habit of the tree in the mountains. The trunk is perfectly straight.

Pinus aristata of Engelmann, the only form in our region of the earlier-named *P. Balfouriana* of California (from which it differs only in the armed tip of the cone-scales), is well called Fox-tail Pine from the appearance of the leafy branches, on which the closely set leaves persist for a dozen years. It belongs only to high mountains and to latitudes north of the forty-first parallel, and is nowhere found out of the drier districts and their immediate borders. It is a small tree, of only botanical interest except in the mountains of Nevada, in the southern part of which it abounds at the elevation of 7,500 or 8,000 feet, or rather once abounded, for, as Professor Sargent states, the trees within reach are fast being cut away to supply the mines with timbering. For this purpose its strong and close-grained, tough, and reddish wood is preferred to that of any other available tree.

Pinus monophylla, the single-leaved Nut Pine, is a most characteristic tree of the interior basin, mainly of the western and southern part of it, which it only slightly overpasses in Arizona and Southeastern California. It is a tree of slow growth, and of only ten to twenty feet in height, yet with trunk sometimes two feet in diameter, and with white and soft resinous wood, furnishing valuable fuel, and in this region of narrow choice it is much used for making charcoal. The great importance of the tree was, and still is, in the crop of large and delicately flavored seeds which it yields, constituting a staple article of food for the Indians of the Great Basin.

Pinus edulis, the Piñon or Nut Pine of the Southeastern Rocky Mountains, extends from the Arkansas to New Mexico and Arizona, a tree not larger than the foregoing, also has its importance in its edible seeds, and in the value of its wood for fuel.

Pinus flexilis, the White Pine of the Rocky Mountains, and belonging to the same general section as the Atlantic White Pine, but peculiar in its thick cones and good-sized edible seed, inhabits the higher region of the Rocky Mountains from Montana to New Mexico and the higher Nevada ranges. What is considered as a short-coned variety of it (*albicaulis*) is the highest tree, commonly reduced to a shrub, on and around alpine summits of the Sierra Nevada throughout all its length, and even northward in the Cascade Ranges to latitude 53°, in British Columbia. In the Rocky Mountain region this tree becomes large enough to be sawn into boards; and its light and soft wood is the best substitute for the Eastern white-pine lumber.

Pseudotsuga Douglasii, the Douglas Spruce, the most valuable timber tree of the west coast (with the possible exception of the Redwood), is hardly one of the second rank in such of the interior districts as it inhabits. But it is apparantly absent from all the ranges west of the Uintas and south of the forty-second parallel until the western slope of the Sierra Nevada is reached, and is not very abundant in those of Colorado and New Mexico. It extends along the northern Rocky Mountains almost to latitude 54°, and a stunted variety descends on its eastern flanks. It is found scattered among other Coniferæ at middle elevations. But from Oregon to British Columbia, toward the coast and in the river valleys, this noble tree forms entire and vast forests, and takes a development in size and in numbers which is truly extraordinary. A large-fruited variety (*macrocarpa*) occurs at the southern extremity of the Sierra Nevada at no great elevation, and extends even into Mexico.

Picea Engelmanni (*Abies Engelmanni* of Parry, the discoverer), the

Spruce of the higher Rocky Mountains, is an important and good-sized timber-tree. It forms the principal part of the forest in Colorado between 8,500 and 11,000 feet, and at the upper tree-line is dwarfed to a shrub, accompanying *Pinus contorta*, but growing also at higher elevations. It is the representative of the Atlantic Spruces, in aspect and in the character of the lumber resembling Black Spruce, while the cones are just intermediate between those of the White Spruce and of the following. Distinct as they are on the whole in character and in station, it does seem as if these ran together in a series of specimens; while, on the other hand, on its northeastern limits, between the Peace River plateau and the Athabasca, east of the Rocky Mountains, in latitude 54° and 55°, *P. Engelmanni* seems to pass into *P. alba*. This species extends southward into Arizona, westward somewhat into the higher mountains of Nevada, and northwestward into the interior plateau of British Columbia. It should there be studied in its relations to *P. Sitchensis* of the northwest coast, the original *Abies Menziesii*.

Picea pungens, as Dr. Engelmann now calls it, the "*Abies Menziesii*" of Colorado, to the Rocky Mountains of which it is nearly confined, belongs to an elevational range just beneath that of *P. Engelmanni*, being sparsely associated with *Pinus ponderosa*, while the latter attends (and generally dominates) *P. contorta*, both, however, affecting moister soil, as is the habit of the Spruces. The timber of the two is probably not unlike. The rigid and prickly-pointed leaves render the name of *P. pungens* appropriate. This species takes kindly to cultivation both in England and in the Northern Atlantic States. A portion of the young trees display a very glaucous foliage, and are much admired.

Abies concolor, the more southern of the two Firs of the Rocky Mountains, accompanies *Picea Engelmanni* and *Pinus contorta* in the southern part of Colorado, and extends to New Mexico, where Fendler collected the specimens originally named. It passes westward in the mountains of Southern Utah and Arizona, and thence extends, according to Engelmann's identification, into and through the whole length of the Sierra Nevada, from 8,000 down to 3,000 or 4,000 feet of elevation, there becoming a pretty large tree. Its soft wood, like that of the eastern Balsam Firs, is of little account. The same is to be said of—

Abies subalpina, the more southern Rocky Mountain Fir, with smaller cones, which most resembles the eastern *A. balsamea*. This, from Central Colorado and from towards the upper forest limit, extends northward to British Columbia, and northeastward to beyond the mountains (where it may meet and even pass into the Balsam Fir), and northwestward perhaps almost to the Pacific coast. In the United States at least, it nowhere constitutes any important portion of the forest.

Larix occidentalis, the Western Larch, belongs only to the northern part of the Rocky Mountain forest region, and to the moister portion of this. Even there it seems to be an unimportant tree.

Juniperus Virginiana, the Red Cedar and Savin, is a tree of great range, as it extends from the Gulf of Saint Lawrence to that of Mexico, and northwestward into British Columbia, while southwestward it reaches Utah. In the Northern Rocky Mountains it is associated with *J. sabina;* in the Southern with the following species. Invaluable as its wood is, the tree is not large or abundant enough in the region under consideration to be of much account.

Juniperus occidentalis and *J. Californica*, the Western Red Cedars, have also a great range, a dubious variety of the former (too near a Mexican species) being the Cedar of Western Texas. The two in their various forms are very striking and characteristic trees of the dry interior region. Like the eastern species, they are sometimes mere shrubs, sometimes large but low trees.

Juniperus pachyphlœa, named for its very thick bark, which is likened to that of a Pine or of White Oak, takes the place of these species in Western New Mexico and adjacent parts of Arizona.

These are the trees of which the forest is composed, and which are the sole reliance for construction and fuel. Of their value to the country, of the importance to the country of their preservation, of the sad inroads that are made upon them by fires, and of their rapid consumption by the inhabitants, especially in mining, it is superfluous here to discourse.

The few angiospermous trees are of quite inferior importance, and the following are the only considerable ones:

Cercocarpus ledifolius, called Mountain Mahogany, is peculiar to the mountains of the Great Basin and of its borders. It is commonly a mere shrub, but at between 6,000 and 8,000 feet on the mountain sides it forms a small tree of 20 to 40 feet in height and a trunk which has in some cases reached the girth of 7 feet at base. The wood "is of a bright mahogany color, and susceptible of a beautiful polish, is exceedingly hard, heavy, and close grained, but very brittle, and so liable to heart-shake and difficult to work as to be useless in the arts. It is, however, sometimes employed for the bearings of machinery, where it is found to wear as well as metal." "It is," continues Professor Sargent, from whom these extracts are taken, "probably the only North American wood which is heavier than water," its specific gravity being determined by him to be 1.117 and its rate of growth so slow that "an examination of several specimens from one to two hundred years old shows an annual increase of wood only one-sixtieth of an inch in thickness."

Negundo aceroides, the Ash-leaved Maple, is found in valleys along water-courses in the southern part of the Rocky Mountains, and as far west as the Wahsatch, and south to New Mexico and Arizona, while in California it is represented by a closely allied species. Its eastern extension is to Canada and the borders of New England. Sugar is sometimes made from its sap.

More important and conspicuous are the Poplars, which, growing wherever there is running water traversing even very arid districts, form a feature where streams issue from the mountains, and are the principal available shade-trees in places artificially irrigated, while their soft white wood is of some account in the absence of better. The Poplars of this kind, or the Cottonwoods of the region, are:

Populus monilifera, the Eastern Cottonwood, which reaches the eastern slope of the Rocky Mountains, but probably does not cross them.

Populus Fremonti, a Californian species, a doubtful variety of which (or perhaps *P. Mexicana*) is the prevalent Cottonwood of the southern part of the interior district.

Populus trichocarpa, a kind of Balsam Poplar, which ranges from British Columbia to Southern California, and reaches Western Nevada.

Populus balsamifera and its broad-leaved variety, *candicans*, Northeastern Poplars, which reach and more or less cross the Rocky Mountains; and the related—

Populus angustifolia, the common Balsam Poplar of the middle part of the whole region under consideration.

Populus tremuloides, the American Aspen, is perhaps the most widely distributed of North American trees, and economically one of the most insignificant, except that the soft wood is used of late for paper pulp, and in Utah it is said to be employed in turnery and for flooring. It ranges from the Arctic coast to all the cooler parts of the Atlantic States, through the Rocky Mountains to New Mexico and Arizona, and on the western side of the continent to the middle of California. It is always a small tree, fond of moist bottoms and slopes, but on the higher mountains southward it takes to the higher ridges, and forms thick copses toward the upper limit of tree growth.

Betula occidentalis is a sparing but somewhat noteworthy element of the Rocky Mountain forest along its northern border in British Columbia, and is found down to Colorado and New Mexico, yet only as a shrub; also along the Sierra Nevada, where, at its southern known limit, above Owen's Valley, and in a dry region bordering the Great Basin, "it is reported to be abundant, and often the main reliance of the settlers for timber for fencing and other purposes." (Bot. Calif., ii, 79.)

From the whole region Oaks are conspicuously absent as trees, though *Quercus undulata* and the forms referred to it are prominent as shrubs southward on the eastern slopes of the Colorado Rocky Mountains, and around them into New Mexico and Arizona, and although one or two Mexican types, such as *Q. hypoleuca*, *Q. Emoryi*, and *Q. reticulata*, form small trees in the southern portions of Arizona.

The shrubby vegetation might be taken into account in connection with the forest growth. But in this region, where almost everything that is perennial becomes more or less lignescent, and where a predominant part of the vegetation of the woodless districts is suffruticose, the herbs and shrubs may as well go together.

Without entering here into a comparison of the Rocky Mountain forest with any other, it may be noted that the species are peculiar to the region or the vicinity of it, with a few exceptions. *Prunus Pennsylvanica*, *Populus balsamifera*, *monilifera*, and *tremuloides*, may be said to come in from the northeast, and only the last extends far into the district. The *Negundo* and *Juniperus Virginiana*, with *Fraxinus viridis*, belong to the Atlantic forest region, and do not penetrate far, unless we count the Californian *Negundo* as a derivative form. The connection with Pacific forest species is closer; and for the rest they are mainly Mexican plateau types, of which the botanical district in question may be regarded as a northern extension.

2. *Characteristics of the herbaceous and shrubby vegetation of the Rocky Mountain forest region.*

It was convenient and, indeed, needful to take the sylva of this region into one view, extending from British Columbia to New Mexico and Arizona, and from the Rocky Mountains to the western verge of the Great Basin. But in its northern part the distinction between woodland and woodless country is less marked, and the general botany is comparatively homogeneous throughout the whole latitude, the Atlantic and Pacific forests being there in fact confluent. Along the southern border, under very different conditions and with little and sparse forest, there is an analogous intermingling of the botanical elements, and the general vegetation of these wide-apart extremes is very different. Our personal observations were made on a middle and typical belt, on which the botany of the central region under notice is most largely developed and purely exhibited, and where Atlantic and Pacific botany are most widely separated geographically. We shall do well, therefore, to restrict our sketches to this central belt, comprising Colorado and the southern part of Wyoming on the east, Utah in the center, and Nevada at the west.

And when treating of the vegetation which is fostered by the forest, there is, in fact, only the eastern half of the district to consider, *i. e.*, the proper Rocky Mountains, the Wahsatch, and the Uintas, which connect these two systems. Far westward, throughout the Great Basin proper, there is not forest enough to impress any botanical character upon the humbler growth, although wherever there is moisture there is a vegetation to correspond.

As has already been suggested, the timber region is more extensive than the grounds actually bearing forest. The contraction of the latter to its present limits is, no doubt, largely a consequence of forest fires through a long course of years; but we suppose that it is also due to an antecedent or accompanying stage of increasing desiccation of the country—a stage which, however, had passed its crisis before our acquaintance with the region began, the turn being testified to by the increase in the height of the water in the Great Salt Lake during the last thirty or forty years. We shall not strain the facts, in any case, if we include in the botany of the forest region, not only the plants which are now sheltered by forest, but those which extend either downward or upward over ground which might well nourish the same kind of tree growth. This is the vegetation of the mountains, as distinguished from that of the high plains.

The peculiar shrubs of the Rocky Mountains (including the Wahsatch Range and corresponding ranges farther north) are only *Jamesia Americana*, a Hydrangeous genus of no near affinity to any other, except *Fendlera*, which (equally unique) belongs to a lower region in New Mexico and Western Texas, *Robinia Neo-Mexicana*, which is an outlying species on the southeastern border, *Quercus undulata*, *Rubus deliciosus*, *Philadelphus microphyllus*, *Ceanothus Fendleri*, and *Berberis Fendleri*, the latter a species of the *Vulgaris* type. They are all southern; the Northern Rocky Mountains have no characteristic shrub, as they have no characteristic tree. The principal shrubs which they share with the Pacific forest region are *Acer glabrum*, *Prunus demissa*, *Rubus Nutkanus*, *Spiræa discolor*, *Ribes*, 3 or 4 species, *Symphoricarpus oreophilus* and *rotundifolius*, *Ledum glandulosum*, *Salix Geyeriana*, and, if we come down to such low frutescent growth, *Pachystima Myrsinites*, and *Berberis repens*.

Arctostaphylos pungens, a species of the Mexican plateau, which appears to have taken a wonderful development and diversification in California, of which it is the prevalent shrub, has reached the western portion of the Rocky Mountain Region as high in latitude as the forty-first parallel, and at an altitude which brings it among the forest shrubbery.

The shrubs which are common to this and to the Atlantic forests are not numerous nor of sufficient interest to be specified. They are such as *Ampelopsis*, *Cornus stolonifera*, and the like. The genus *Shepherdia*, however, is somewhat noteworthy. *S. argentea*, the Buffalo Berry, which seems most at home in the Northeastern Rocky Mountains, and which extends much beyond them in the same direction, along with its relative *Elæagnus argentea*, extends southward even to New Mexico, and westward to the Sierra forming that rim of the Great Basin; and it is accompanied by *S. Canadensis*, a characteristic shrub of the northern border of the Atlantic forest. The third species of the genus is peculiar to Southern Nevada.

Of the shrubs which traverse the continent and completely enter the Pacific forest the following are the principal:

Rhus glabra.
Rhus aromatica.
Neillia opulifolia.
Pyrus sambucifolia.
Symphoricarpus racemosus.
Symphoricarpus occidentalis.
Lonicera involucrata.
Sambucus racemosus (*pubens*).
Betula glandulosa.
Alnus incana?
Corylus rostrata.
Juniperus communis.
Juniperus sabina?
Arctostaphylos Uva-Ursi, if we condescend to one so low.

The last three and the *Sambucus* are of the Old World, North Asiatic as well as European. They are all of northern range, and are there somewhat continuous across the continent, although extending well southward along the mountains.

A full analysis of the herbaceous vegetation would run too far into details. We can mention only the peculiar types and some of the genera which are characteristically prominent.

The three genera (each of a single species) which are wholly restricted to the Rocky Mountains are *Chionophila*, which is strictly alpine, and has been already mentioned as such, and *Leucampyx*, an Anthemideous Composita (both of southern habitat), and *Orogenia*, S. Watson, a little Umbelliferous plant, with habit of *Erigenia*, but too little known to speak of.

Synthyris, a Scrophulariaceous genus of seven species, is a characteristic but not quite a peculiar type, one of the seven species being of more western habitat, and one on the eastern verge of the Atlantic region.

Hesperochiron of S. Watson is a peculiar Hydrophyllaceous type, but both species occur also in the Sierra Nevada.

Lewisia is a most characteristic and almost peculiar genus; but the original species has been found even in California, and a second one occurs on the southwestern rim of the Great Basin.

Townsendia is a highly characteristic genus, but some species belong to the alpine regions above and some to the dry plains below the forest region, and a few have a more western range.

Sidalcea candida is a restricted species of a genus peculiar to our and a more western region.

Glycosma, *Cynapium* of Nuttall (now in *Ligusticum*), *Camassia*, *Corydalis Caseana*, *Parnassia fimbriata*, *Gaultheria Myrsinites*, and the considerable genera *Wyethia* and *Helianthella*, are in very similar case.

Calochortus is a most characteristic type of numerous species, some of the Rocky Mountains, more of them Californian, and a few Mexican.

Adenocaulon bicolor (of a peculiar genus, which is also both Eastern Asiatic and Chilian) is rather a western coast plant, which has traversed the Rocky Mountains at the north, even to Lake Superior.

Frasera, a marked and wholly North American genus, has given one species to the Atlantic forest, and shared two or three with the western region.

But the characteristic features of the Rocky Mountain herbaceous vegetation in the region specified, taken as a whole and in reference to abundance both of forms and of individuals, are imparted by the following genera, which have assumed their maximum development in and west of these mountains, and are mainly if not quite peculiar to North America.

Gilia, *Collomia*, *Phlox*, and *Polemonium*, of the order *Polemoniaceæ*.

Pentstemon, *Castilleia*, and *Mimulus*, of the order *Scrophulariaceæ;* and *Pedicularis* here takes its principal American development in the higher regions.

Phacelia in *Hydrophyllaceæ*, but most of the species are below the forest district and of westward range.

Eriogonum of *Polygonaceæ*, of which the same is to be said, although a few species are conspicuous in the wooded region.

Compositæ are very prominent, as they are throughout North America, and the genus *Aplopappus* might be added to the foregoing; but the most characteristic genera are not in the wooded region. There, too, the species of *Solidago* and of *Aster* are less numerous than at the East, and *Erigeron* is more prominent than *Aster*.

The number of species of *Astragalus* in the Rocky Mountain and more western districts is inferior only to those of Asia, but they mostly affect the unwooded plains.

Peculiar to and conspicuous in the cooler wooded region are the two beautiful long-spurred species of *Aquilegia*, *A. cærulea* and *A. chrysantha*, the former alpestrine, the latter at lower elevations, neither found north of Colorado.

A few of the Rocky Mountain wooded-region shrubs occur on the higher mountains and ravines of the Great Basin, probably more of them than are yet recorded. Of additional species only two come to mind, and both are peculiar. They are—

Shepherdia rotundifolia of Parry, in the mountains of Southern Utah.

Peraphyllum ramosissimum, Nutt., a peculiar Pomaceous genus, along the western rim of the Great Basin.

A few other higher-mountain species of *Ceanothus* come in from California, as to various herbs; but we call to mind no characteristic species of the basin which belong unequivocally to the forest district.

III.—WOODLESS REGIONS BELOW FOREST.

These may be distinguished into the lower mountain slopes, the western arid district, of which the so-called Great Basin is the center and the exemplar, and the less arid, unbroken plains east of the proper Rocky Mountains.

1. *The Lower Rocky Mountain Slopes*, including the "parks," so called, of Colorado and valleys which are not condemned to a saline vegetation, partake of the growth above and below, but they have a good number of characteristic plants. The prevalent characteristic shrubs are largely Rosaceous. They are:

Cercocarpus parvifolius, along with *C. ledifolius* when that is not reckoned among the trees; the former a species which is even more common on all Californian foot-hills. These districts are the headquarters of this peculiar genus, although the latter was founded on a Mexican species.

Cowania Mexicana, which is likewise Mexican, as the name intimates.

Purshia tridentata, which extends much farther north than the others, but not ascending above the base of the mountains.

Spiræa discolor, which in its various forms flourishes under exceedingly different altitudes.

Spiræa Millefolium, which is quite peculiar to the Great Basin.

Spiræa cæspitosa should be added, although it spreads in mats over the face of rocks, concealing its trunk, instead of rising into the air.

Coleogyne ramosissima, a highly peculiar genus of a single species, found only on the southern border of the Great Basin.

Prunus Andersonii, of the Amygdaleous type, restricted to its southwestern rim.

Hardly elsewhere is such an assemblage to be found. Of other shrubs, *Ceanothus velutinus* and *Ribes cereum* are the most widespread and abundant. One species of *Ephedra* extends along the mountains almost to the northern border of the Great Basin, and two or three more are among the characteristic shrubs of the region south of it.

As to herbs, the genera and the groups mentioned above as predominant at a greater elevation (especially *Gilia*, *Pentstemon*, *Phacelia*, and *Eriogonum*) still play a prominent part. *Astragali* become more numerous, as also do white-flowered species of *Œnothera*, and Helianthoideous, Helenioideous, and Senecionoideous Compositæ are conspicuous, yet not more so than in other parts of North America. Few Compositæ are peculiar to this zone, and few genera are peculiar to the Rocky Mountain region as distinguished from the Californian. The more characteristic genera of the whole region may be adverted to in another connection.

2. *The arid or desert interior district*, namely, that between the Rocky Mountains and the Sierra Nevada, the central part of which is the Great Basin proper, with no exterior drainage, but which also extends far north between the Rocky Mountains and the Cascades, and is there drained by the Columbia River, and far south over the district through which flow the waters of Rio Colorado and the Gila, with also an extensive eastern outlier between the Wahsatch and the Colorado Rocky Mountains, and, as well, north of the Uintas, drained by the Green River, the main and farthest source of the Colorado, where an arid woodless tract, with all the features of the Great Basin, broadly intersects the wooded Rocky Mountain ranges. The mountains which traverse and diversify these deserts are thought to occupy about half the area, and although many of them appear to be as bare as the intervening valleys, yet their varied surface and exposure and the condensation of moisture which they compel, even from an unwilling air, nourish a different vegetation, consisting of a larger number of species. This having already been noted, only the botany of the valleys and plains is under present consideration.

The region, in a general botanical view, is one of *undershrubbiness;* and the prevalent growth is composed of *Artemisias*, *Chenopods*, and lignescent small-flowered Compositæ. It cannot be better described than in the terms employed by Mr. Watson in King's Exploration (Rep. xxiv, xxv), which is here accordingly cited:

"No portion of this whole district, however desert in repute and in fact, is destitute of some amount of vegetation even in the driest seasons, excepting only the alkali flats, which are usually of quite limited extent. Even these have frequently a scattered growth of *Sarcobatus* or *Halostachys*, surmounting isolated hillocks of drifted sand, compacted by their roots and buried branches.

"This vegetation, covering alike the valley plains, the graded incline of the mesas, the rounded foot-hills, and the mountain slopes, possesses a monotonous sameness of aspect, and is characterized mainly by the absence of trees, by the want of a grassy-green sward, the wide distribution of a few low shrubs or half-shrubby plants, to the apparent exclusion of nearly all other growth, and by the universally prevalent gray or dull olive color of the herbage. * * * The turfing 'Buffalo' or 'Grama' Grasses, which make the plains east of the Rocky Mountains a vast pasture for the bison, deer, and antelope, are here unknown. There are, indeed, various other species more or less abundant in localities, but always growing in sparsely scattered tufts and dying away with the early summer heats, or to be then found only in favored spots in the mountain cañons. Two or three species that may be said to mat into a sward are confined to alkaline meadows, and are nearly worthless for pasturage.

"Of the more predominant species which form the mass of the shrubby and perennial vegetation of the entire region, some are confined almost wholly to the more saline localities. Of these the *Halostachys occidentalis* is an exclusively alkaline shrub, growing where almost no other plant will. Much more widely distributed and abundant is the *Sarcobatus vermiculatus*, found nearly everywhere in the lower valleys where there is a decided amount of alkali, but rarely extending much beyond such limits. The more frequent plants accompanying these are *Salicornia herbacea* and several species of *Suæda*, and other mostly Chenopodiaceous plants, and, if there are grasses at all, *Brizopyrum spicatum* and *Spartina gracilis*.

"On the somewhat less alkaline and drier portion of the valleys are found in frequent abundance *Atriplex confertifolia* and *canescens*, or the nearly as common *Grayia polygaloides*, and rather less abundantly *Artemisia spinescens*, *Eurotia lanata*, and *Kochia prostrata*. Sometimes mingled with them, but wholly free from alkaline preferences, and beyond their range usurping entire predominance, is the 'Everlasting Sage Brush,' the *Artemisia tridentata*. This is by far the most prevalent of all species, covering valleys and foot-hills in broad stretches further than the eye can reach, the growth never so dense as to seriously obstruct the way, but very uniform over large surfaces, very rarely reaching the saddle-height of a mule, and ordinarily but half that altitude.

"The 'Broom Sage' *Bigelovia graveolens* occurs in considerable abundance along the dry valleys, often accompanied by *Tetradymia canescens;* but upon the gravelly foot-hills the smaller *Bigelovia Douglasii* is much more frequent."

One or two names are changed in copying so as to conform to the more recent nomenclature. *Eurotia lanata*, though it happens not to come into the above extract, is among the commonest of these plants, and is one of the widest in range. Some *Astragali*, various *Eriogona* and *Giliæ*, also several *Phaceliæ* and *Œnotheræ*, would be next in prominence, the *Eriogona* much the most so. But the peculiarity of the basin flora lies as much in the absence of other genera which characterize adjacent districts as in the ubiquity of those which have been mentioned.

The genera peculiar, or nearly so, to the Great Basin proper and its borders are chiefly—

Physaria, a genus which was confounded on mere habit with *Vesicaria*, belonging to the foot-hills rather than to the valleys, the principal species extending around the whole limits of the region, a peculiar one at the north and another at the south.

Platyspermum, Hook., a little Cruciferous annual of the western border.

Purshia, DC., a Rosaceous shrub, already mentioned.

Tricardia and *Conanthus*, of S. Watson, Hydrophyllaceous herbs, the latter close to *Nama*, the former a peculiar genus.

Oryctes, Watson, a rather obscure Solanaceous herb of Western Nevada.

Nitrophila, Watson, an Amarantaceous herb of alkaline soil.

Grayia, Hook., a Chenopodiaceous undershrub, already enumerated as one of the most characteristic of the desert plants. (*Sarcotatus* would go with it, except that it crosses the Rocky Mountains and abounds on the upper waters of the Missouri, where it was first known, being the Pulpy Thorn of Lewis and Clark.)

Hermidium, Watson, a Nyctagineous perennial of the western edge of the basin, intermediate between *Bougainvillea* and *Mirabilis*.

Oxytheca, Nutt., an offshoot of the great genus *Eriogonum*.

Tetradymia, DC., characteristic shrubby Senecioneous Compositæ of two or three species, which slightly overpass the borders of the basin.

Glyptopleura, Eaton, of two species, and *Anisocoma*, Gray, of one, depressed Cichoraceous annuals or biennials.

Chætadelpha, *Blepharipappus*, and *Rigiopappus*, each of a single species, and *Psathyrotes* of two, southern in range, also Compositæ.

There is, besides, *Caulanthus* of S. Watson, of two or three very characteristic desert species, but some Californian, and the genus is only artificially distinguished from *Streptanthus*, species of which reach the Pacific coast on the one hand and Missouri to Texas on the other.

Eremochloe, S. Watson, is a peculiar genus of grasses, one species peculiar to the basin, another to the southeastern part of New Mexico.

The arid region south of the Great Basin we propose only in a general way to refer to. It is one in which there is no barrier to the spreading of the same species from the Gulf of California to the Gulf of Mexico, and in which the plants of the basin region, of Southern California, of Texas, and of the Mexican plateau and mountains meet and mingle. This district has also a good number of peculiar genera of shrubs: *Salazaria*, in Labiatæ; *Holacantha*, a spiny Simarubacea; *Canotia*, a rather doubtful Rutacea, to which might be added *Thamnosma* except that a second species is Texan; and *Chilopsis*, which extends into Mexico; among herbs, *Canbya*, a singular little Papaveracea; *Petalonyx*, in Loasaceæ (also *Cevallia*, which extends both to Texas and Mexico); *Hesperocallis*, in Liliaceæ; *Dithyræa*, which has been joined to the Old World genus *Biscutella; Wislizena* and *Oxystylis*, in Capparidaceæ; *Achyronychia*, in Illecebraceæ; and among Compositæ the genera *Baileya*, *Riddellia*, *Hymenoclea*, *Hymenothrix;* and here also are the headquarters of *Laphamia* and *Perityle.*

3. *The eastern woodless plains.*

If the arid district of the interior of the United States west of the eastern Rocky Mountains is denominated the region of "Sage Brush" (*i. e.*, of shrubby *Artemisia* and *Chenopods*), the mostly less arid, less saline, equally homogeneous, and even more extensive plains between the Rocky Mountains and the eastern forest region may be characterized as the region of Buffalo Grasses. Its full development is between latitude 35° and 45°, where it occupies an average of ten degrees of longitude. North of this it is narrowed or interrupted, and then merges into a district which is woodless from cold or from the nature of the soil, and at length arctic. Southward it is equally broad, and it trends westward and loses itself in the New Mexican plateau region, which has a certain character of its own, but in which the eastern forms of vegetation mingle first with those of the Rocky Mountains, with those of the Mexican plateau, and at length with those which prevail in the Great Basin.

The whole region rises very gradually westward and abuts against the mountains at an elevation of, for the most part, fully 5,000 feet. The annual rainfall on its eastern border is from 24 to 32 inches, tolerably well distributed; in its western part 14 to 16 inches. Upon the climatic characteristics, topography, &c., which have been well presented in various reports and summaries, especially in those published by Dr. Hayden, it is not our purpose to enter.

Nor have we here any special call to discuss the vexed "prairie question," viz, why it is that the eastern border of this broad district should be treeless, except along river banks, even where the annual rainfall is from 28 to 32 inches, and 8 to 10 inches of this in summer—as much rain as is in the upper part of Michigan and on the Canada shore of Lake Huron; also why prairies exist as deep bays or islands within the Atlantic forest region. Suffice it to note that the prairies east of the Mississippi are mainly restricted to places having little or no more rainfall than that mentioned above; also that where annual fires have been prevented, original prairie surfaces are changing into forests,* and that, generally, trees properly planted or raised from seed, with some nursing at the start, are found to thrive along this whole border.

In view of this, and of the well-known habit of the Indians to burn over the dry vegetation of the plains and prairies in autumn, we had thought it most probable "that the line of demarkation between our woods and our plains is not where it was drawn by nature"; that "between the ground which receives rain enough for forest and that which receives too little, there must be a debatable border, where comparatively slight causes will turn the balance either way," and where "difference in soil and exposure will tell decisively." And along this border, annual burnings, for the purpose of increasing and improving buffalo feed, practiced for hundreds of years by our nomade predecessors, may have had a very marked effect in carrying this woodless district farther eastward than it otherwise might have reached.†

Along with this, a more hypothetical cause may be assigned, which, if valid, will help in other explanations. That natural rain-gauge, the Great Salt Lake in Utah, informs us that the rainfall is now increasing over the western border of the region under consideration. We know what the maximum height of the water was very long ago; but we know not the minimum. It is not improbable that this era of increasing moisture is of no recent commencement, but has supervened on an earlier one of greater dryness than the present, and that this affected the great plains east, as well as the great basin west, of the interposed Rocky Mountains. In that case districts may now bear forest, under man's care, which would have been incapable of it before this cycle commenced or had attained the present condition.

The western portion of these plains is not only drier, but in some parts alkaline, or with other characters of soil uncongenial to forage grasses, especially at the north, where there are only two inches of rain in the three summer and no more in the three winter months. A good deal of the southern part gets about four inches of summer rain, but only half as much in winter. In some parts, accordingly, the characteristic vegetation of the ultramontane plateau intrudes. The Pulpy Thorn, *Sarcobatus*, and its Chenopodeous associates are largely developed on the Upper Missouri waters, accompanied by a peculiar Sage-Brush, *Artemesia cana*, while the *A. tridentata* is rather rarely established on this side of the mountains.

We have termed this district the region of Buffalo Grass. The grasses form such an inconspicuous and unimportant a feature in the interior arid region that it has not been worth while to mention them, and even on the mountains, except in the alpine region, they are of small account.

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* *Vide* Prof. C. A. White, in Amer. Jour. Sci., Oct., 1878.

† See Forest Geography and Archæology, in Amer. Jour. Sci., 1878, Ser. 3, xvi, 94,—

the broad district between them, stretching from the plains of Arkansas to Dakota on the east to the Sierra Nevada and Cascade Mountains on the west. Then the alpine vegetation, already treated of, is left out of view, except in the case of endemic genera or forms not belonging to to the arctic-alpine flora. And it must be kept in mind that the eastern slopes and outliers of the Sierra and its continuation, below the wooded portions, belong to the Great Basin or to the region reckoned with it. So we do not reckon *Pinus monophylla*, nor *Chilopsis saligna*, nor *Leucocrinum*, and the like, as common to the Great Basin and the Pacific floras, but as pertaining to the former only; and generally we do not take account of species which merely overpass the border of the region they belong to. For example, we should not reckon *Anemone Nuttalliana*, nor *Dalea alopecuroides*, nor *Collinsia parviflora*, and hardly *Rubus Nutkanus* as constituents of the Atlantic United States flora. Such limitations heighten the contrast between the compared floras, but render the comparison more manageable and effective, and also, as to the broad outlines, really more faithful to nature than they would be if the materials were indiscriminately collected from the descriptive books and every denizen of the frontiers regarded as a true citizen.

All naturalized plants and weeds of cultivation are, of course, neglected, including such as may be of American origin but which have accompanied man, even the aborigines of the country, almost everywhere. They belong to no particular flora, or at least are not characteristic of any.

The natural orders may be taken up *seriatim.*

RANUNCULACEÆ.—Are represented on the Atlantic side by eighteen genera, on the Pacific by fourteen, in the intermediate region (the Rocky Mountain flora in the broadest sense) by twelve. The species are in nearly the same relative proportion, and a considerable number are common even to all three floras, the most striking case of this being that of *Clematis* (*Atragene*) *verticillaris.* All the genera of the Rocky Mountain flora (if we except *Crossosoma*) are amphigæan.* Of such genera, *Pæonia* is peculiar to the Pacific, and *Hepatica* (if ranked as a genus) only to the Atlantic flora. The peculiar genera are *Trautvetteria*, Atlantic and Pacific; *Hydrastis* and *Xanthorrhiza*, wholly Alleghanian; and *Crossosoma* of California, a genus of dubious affinity, but probably nearest *Pæonia*, in two species, one which belongs to the Arizonian district. The species of *Delphinium* increase from the Atlantic westward, and are remarkably prominent in California.

MAGNOLIACEÆ.—Of three genera and eleven species in the Atlantic flora; are wholly absent from the westward floras.

ANONACEÆ.—Have a peculiar genus (the so-called Papaw) in the Atlantic flora, but nothing to the west of it.

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* This is the most convenient designation of the genera indigenous to Europe and Northern Asia as well as to America.

MENISPERMACEÆ.—Of three genera and as many species in the Atlantic flora; are equally wanting westward.

BERBERIDACEÆ.—This is a marked family in North America. The amphigæan genus *Berberis* has genuine Atlantic and one (southern) Rocky Mountain species; the western mountains have a characteristic and common low *Mahonia* (and another on the southern border); and there are two or three more on the Pacific side. Of herbaceous types the whole central region has none; the Pacific coast has *Vancouveria* and *Achlys*, peculiar genera of single species; the Atlantic has those four special genera, *Caulophyllum*, *Diphylleia*, *Jeffersonia*, and *Podophyllum* peculiar to it and to Northeastern Asia, of single species to each continent.

NYMPHÆACEÆ.—Of the typical genera, *Nymphæa* is represented only in the Atlantic flora and by two peculiar species (with others in Florida and Texas), and *Nuphar* by three species; a peculiar *Nuphar* belongs to the two western floras. *Nelumbium* has only an Atlantic species, which even reaches to the West Indies. *Brasenia*, that genus and single species of wonderful distribution, is common on the eastern and not very rare on the western coast. *Cabomba* is peculiarly Atlantic.

SARRACENIACEÆ.—This wholly American order of Pitcher-plants has its leading genus of six species confined to the Atlantic border; a single curious representative, *Darlingtonia*, on the mountains of California; the third genus is on a mountain in Guiana.

PAPAVERACEÆ.—This small order, the typical genus of which is represented in America only by an arctic-alpine species, has its largest and most remarkable generic diversification in North America, and in the belt of country now under observation, partly on the Atlantic yet more strikingly on the Pacific side. But, except for an *Argemone* which is very conspicuous over the great plains, and the alpine *Papaver*, sparingly met with on the highest peaks, the order is absent from the Rocky Mountain flora in general. No European type is indigenous to Eastern North America, and only one of the American is Japano-Asiatic, viz., *Stylophorum*, of course on the Atlantic side. The other Atlantic genus is *Sanguinaria*, which has no fellow. But California has a species of the European genus *Meconopsis* and the following endemic genera: *Romneya* of Southern California, with a large poppy-like flower; *Arctomecon*, poppy-like, except in its stigmas and the anomaly of *persistent petals*; *Canbya*, a curious little plant with the same anomaly (the last two really belonging to the Arizonian border of the interior desert region, although within California); *Platystigma*, including *Meconella*; *Platystemon*, with gynæcium singularly separating into its constituent carpels, so as to simulate a Ranunculaceous plant; *Dendromecon*, a shrub in an otherwise herbaceous family; and *Eschscholtzia*, the only genus which extends into the Great Basin, and the singular characters of which are familar from the forms in common cultivation; add *Hunnemannia* from the Northern Mexican plateau. Next to the Sequoias, perhaps, these Papaveraceæ form the most characteristic note of the Californian flora.

FUMARIACEÆ.—Three genera, of which only the larger one, *Corydalis*, is amphigæan. Its species are of Eastern Asiatic rather than European types and relationship. *C. aurea* and its kindred forms, rather than species extend across the whole continent and to Japan; the striking species described as *C. Caseana*, of the western Rocky Mountains to the Sierra, appears to break into analogous forms which have recently been taken for species. *Dicentra*, peculiar to North America and the Japano-Himalayan floras, has perhaps a majority of American species. They belong wholly to wooded districts. One species crosses the whole continent along the northern border of our belt; in another case Pacific and Atlantic species hardly at all differ; the three or four others are peculiar. *Adlumia*, the remaining genus, is of a single Atlantic species.

CRUCIFERÆ.—For an order of over 170 genera and more than 2,200 species, North America, in her about 40 indigenous genera, none of over two dozen species, cannot be said to have a large share; and the exclusion of Arctic alpine forms reduces the number considerably. The Atlantic Cruciferæ are almost all European in type; *Leavenworthia* and *Warea* are the only peculiar genera. The eastern border of the plains has a local genus, *Selenia*, and there begin the characteristic genera *Streptanthus* and *Stanleya*, and species of *Vesicaria* multiply southward; the Rocky Mountains exhibit no characteristic type, unless it is *Physaria*, but the arid region beyond begins to share with California in the abundance of *Lepidium*, and in the several endemic genera, of which *Thysanocarpus* is the most characteristic. It is the Arizonian region that furnishes the American representatives of the Old Word genus *Biscutella*, the *Dithyræa* of Harvey.

CAPPARIDACEÆ.—Within the limits specified North America has no *Cappareæ*, but all the genera of *Cleomeæ* except two are indigenous and the greater part of them peculiar to it—all in the warmer parts, the number of species and types increasing southwestward, and extending into Mexico. The peculiar types, *Cristatella*, *Cleomella* (of several species), *Wislizenia*, and *Oxystylis*, are characteristic of the southern part of the central region.

RESEDACEÆ we exclude, believing *Oligomeris subulata* to have been a Spanish importation.

CISTACEÆ.—Two of the four genera of this more conspicuously oriental order, *Hudsonia* and *Lechea*, are peculiar to the Atlantic States, to which also three species of *Helianthemum* are indigenous, and there is one species on the coast of California. The order is wanting to the whole intervening portion of the continent.

VIOLACEÆ.—In species of *Viola* North America is as rich as the Old World, and the Pacific flora as rich as the Atlantic and with greater diversity of type; a few species common to each, but most of them peculiar. The central flora has hardly any except in the alpestrine region, and these few and of wide-spread species. A Mexican *Ionidium* reaches Arkansas and Arizona.

POLYGALACEÆ.—Represented by *Polygala*. The Atlantic flora is rich in species, all of them peculiar; the Pacific flora has only two, of a peculiar type. The Texano-Arizonian region has several, some of them Mexican, but from both the mountains and valleys of our belt the genus and the order are nearly absent.

KRAMERIACEÆ.—Should be separately reckoned, whatever view be taken of the affinity of the warm-American (chiefly Mexican) genus *Krameria*. One species reaches the plains of Arkansas, and has obtained a lodgment on the coast of Florida; two or three more extend along the Mexican frontier, but hardly infringe upon the region under consideration.

FRANKENIACEÆ.—Of a single genus, of warm temperate and subtropical coasts; has a Californian and Arizonian species; no Atlantic representative, but there is a quite peculiar species at the southeastern base of the Rocky Mountains.

CARYOPHYLLACEÆ.—The *Sileneæ* are feebly represented (by *Silene* only) in the Atlantic flora, yet by peculiar species; are nearly wanting from the Great Plains, scanty in the Rocky Mountains, but of increasing number and diversity as the Pacific flora is approached. The *Alsineæ*, moderately numerous, call for no remark, except for the increased number of species of *Arenaria* in the interior flora, most of them peculiar. *Stipulicida* is of a single strictly Atlantic species.

ILLECEBRACEÆ.—Nowhere very numerous, but most of the species and genera in the Old World. *Paronychia* is represented in the Atlantic flora; also in that of the plains and the eastern part of the Rocky Mountains. *Anychia* and *Siphonychia* are peculiar to the Atlantic flora; *Pentacæna* to that of the Pacific coast, extending to Chili. *Achyronychia*, a remarkable genus, of one species, belongs to the Arizonian rather than the California flora.

PORTULACACAÆ.—This may be regarded as an American order, although the Purslane has accompanied man all over the world. The single species of *Montia* has an immensely wide distribution over the cool parts of the world. One of *Claytonia* and several of *Calandrinia* are Australian, and two small genera are South African. So, as relates to distribution, it is a very suggestive order. The Atlantic States have only the two earliest known species of *Claytonia* and a *Talinum;* New Mexico has a peculiar genus (*Talinopsis*), too like an African one; the Rocky Mountain region has the characteristic and remarkable genus *Lewisia*, and more species of *Claytonia*, &c.; *Spraguea* and *Calyptridium* are peculiar to the whole country west of the Rocky Mountains proper; *Calandriniæ* are all western; and the Pacific flora contains most of the species of *Claytonia*.

ELATINACEÆ.—Two of our three species of *Elatine* occur in the Atlantic, Rocky Mountain, and Pacific floras; one is restricted to the latter. The Texan *Bergia* very sparingly occurs in the Great Basin and on the Pacific coast.

HYPERICACEÆ.—Represented by three genera, of which the two small ones, *Ascyrum* and *Elodes*, are peculiar to the Atlantic flora (except European relatives of the latter), which is rich in endemic species of *Hypericum*; the Pacific flora has three or four endemic species of the latter, the intervening region nothing of the order.

TERNSTRŒMIACEÆ.—This Eastern American and Eastern Asian order is represented only east of the Alleghanies, and by *Stuartia*, two species (the third in Japan); *Gordonia*, two species, and several hardly genuine species in tropical Asia.

MALVACEÆ.—This is one of the great and cosmopolitan orders, of which North America possesses a fair but not excessive representation. The species and forms here increase in number southwestward. Indigenous plants only being regarded, no genus is common to North America and Europe excepting *Lavatera*, represented by two or three singular and mostly shrubby species of the Californian coast. *Napæa* is strictly peculiar to the Atlantic flora, as also is the unique *Sida Napæa*. *Callirrhoë* is peculiar to the borders of the same district and the plains adjacent. *Sidalcea* is peculiar to the Rocky Mountain and Californian floras. *Ingenhouzia* (which is *Thurberia*) belongs the Western Arizonian flora. *Malvastrum* and *Sphæralcea* (too near generically) are numerous in species on the plains and through the valleys of the Rocky Mountain region. *Kosteletzkya* is represented on the Atlantic coast, but most of the species are Mexican.

BOMBACEÆ.—*Fremontia Californica* belongs wholly to the forest district of the Sierra Nevada, and its only relative is *Cheirostemon*, the Hand-flower of Mexico.

TILIACEÆ.—Excepting one or two outlying plants on the southern borders, this order is represented only by the genus *Tilia*, in two species of the Atlantic States, which hardly cross the Mississippi.

LINACEÆ.—Three or four Atlantic species of *Linum*, as many more on the plains or Rocky Mountains, one species from the plains to the Pacific coast, and the same is an Old World species, or nearly so; and, moreover, in California and Oregon an unique group of seven species (*Hesperolinon*), in which the carpels are reduced from five to three, or even two.

ZYGOPHYLLACEÆ.—Leaving out the species of *Tribulus* or *Kallstrœmia* and the Texano-Arizonian representatives, among which *Fagonia Californica* should be ranked, notwithstanding the specific name, only the Creosote Bush remains, *Larrea Mexicana*, a shrub of the Mexican plateau, which has passed into or near the southern border of our belt all along from Texas to California.

GERANIACEÆ.—In the restricted sense, are few in North America, consisting only of a few species of *Geranium*; the eastern and western perennial ones different; a biennial species of a weedy character is scattered over the continent.

LIMNANTHEÆ.—Are exclusively North American; *Limnanthes*, of two or three species on the Pacific side, the reduced type *Flœrkea* on the Atlantic side also; all wanting to the Rocky Mountain flora.

OXALIDEÆ.—A very few species of *Oxalis*, one peculiar to the east and one to the west, one to the east and middle, and the *O. corniculata* both east and west.

BALSAMINEÆ.—Two species of *Impatiens* in the Atlantic States; none farther westward.

RUTACEÆ.—Mainly a tropical and subtropical order and not largely American, it is only to be noted that the *Ruteæ* are represented along the southern border by *Thamnosma*, a Texan species of which reaches the southern Rocky Mountains, and another belongs only to the southern border of the Great Basin. *Ptelea* extends quite across the continent, whether in one or in three species is uncertain; and two species of *Xanthoxylum* are restricted to the Atlantic border. *Cneoridium* is a little Californian shrub which rather belongs to this order. The American Simarubaceæ are south of our range.

CYRILLEÆ.—Two strictly Atlantic genera, one tropical American and a West Indian one, compose the group.

AQUIFOLIACEÆ are represented only in the Atlantic flora by a dozen species of *Ilex* and the peculiar monotypic genus *Nemopanthes*.

CELASTRACEÆ.—The single *Celastrus* is restricted to the Atlantic flora, which has also two species of *Euonymus;* the Pacific coast has one. *Pachystima* is a genus of two species, one common through the mountains from the Pacific to the Rocky Mountains, the other extremely local in the Alleghanies of Virginia.

RHAMNACEÆ.—Excluding the Texano-Arizonian forms and the subtropical of Florida, we are concerned only with *Rhamnus* and *Frangula*, one species of which crosses the continent northward, two Atlantic only, and two Pacific; *Sageretia* and *Berchemia*, each having one Atlantic coast species; and the great American genus *Ceanothus*. The original species and three others are restricted to the Atlantic flora; three are Mexican; but the rest, twenty or more species, belong to the Rocky Mountains, where there are few, and to the Pacific flora, where they are perhaps the most abundant and characteristic shrubs, forming a large part of the *chaparral*.

VITACEÆ.—*Ampelopsis* belongs to the Atlantic flora, but reaches the southern Rocky Mountains. *Vitis* has eight or nine species in the same flora, and is therefore more developed here than in any other part of the temperate zone. California has one species; the Rocky Mountains and their outlying districts none at all.

SAPINDACEÆ.—Most largely tropical, except that there is a *Sapindus* along the southern frontiers; are represented only by certain genera. Four species of *Æsculus* characterize the Atlantic flora; one, of a different type, the Pacific flora; and there is none between. Five species of *Acer* are peculiar to the Atlantic, two to the Pacific flora; one occurs only in the western Rocky Mountains; one is common to the latter and to the Pacific flora. *Negundo*, which is hardly distinct from *Acer*, has an Atlantic species extending to and through the Rocky Mountains; a second but closely related species takes its place in California. *Staphylea*, which affects only forest regions, has an Atlantic and a (local) Pacific species. *Glossopetalon* is peculiar to the intermediate dry region; the original species occurs on and beyond the southern borders of the Great Basin; a second one is on its northwestern border. *Ungnadia* of Texas is rather too far southwest to be well reckoned in the Atlantic forest flora, yet it belongs to it.

ANACARDIACEÆ.—Represented by the genus *Rhus*. The only species which extends across the continent is *R. aromatica*, in a peculiar western variety. *R. glabra*, the low Sumach, extends to and beyond the Rocky mountains. The common Sumach, the Poison Dogwood, and some others are wholly eastern, while *Rhus Toxicodendron* reaches the Rocky Mountains; on the Pacific side it is replaced by an equally poisonous and very similar species. Southern California has two other species of South American type.

LEGUMINOSÆ.—This being one of the very largest orders in most parts of the world, only characteristic features can be noted. The Atlantic flora is rich in genera, but poor, comparatively, in species; the Pacific is very poor in genera, but several of the genera are very numerous in species. The intervening region on the western side has the Californian character. They may be referred to under the suborders.

PAPILIONACEÆ.—The great preponderance of Pacific species is attributable mainly to the great development of four genera, viz: *Astragalus*, *Lupinus*, *Trifolium*, and *Hosackia*. The latter is the only purely American type of the four, though very near to the Old World genus *Lotus*, and, but for one species which has nearly reached the Atlantic seaboard, would be wholly western.

The only peculiar Pacific genus is *Pickeringia*, of a single species. There is no peculiar genus of the Rocky Mountain flora, *Olneya* being Arizonian. The exuberance of Atlantic genera is largely due to genera which are divided between the Eastern United States and Eastern Asia, such as *Wistaria*, *Apios*, *Amphicarpæa*, *Lespedeza*, *Cladrastis*, and to some exclusive genera, such as *Baptisia*, *Robinia*, *Petalostemon*; also to the absence toward the Pacific of genera which the Atlantic States share with Mexico and South America, such as *Tephrosia*, *Indigofera*, *Sesbania*, *Stylosanthes*, *Desmodium* (the largest Atlantic States genus), *Erythrina*, *Clitoria*, *Centrosema*, *Galactia*, *Rhynchosia*. Moreover, the botany of California should surrender its eleven species of *Dalea*, since they all properly belong to the Arizonian and Great Basin floras rather than to that of the Pacific region. It is a characteristic genus of the Mexican plateau and of its extension northward. *Astragalus*, feebly represented in the Atlantic States, and its appendage, *Oxytropis*, have their American headquarters in the plains and mountains of our interior region, under conditions not unlike those of Northern and Central Asia, where a great majority of the rest of the *Astragaleæ* flourish. *Amorpha* is shared by the Atlantic and Pacific floras. *Thermopsis*, with three local Atlantic species, one in the Rocky Mountains and two in California, has also Eastern Asian species.

CÆSALPINEÆ.—Excluding the Texano-Arizonian forms, the only Pacific representative is a single *Cercis;* the central region has none, except, perhaps, a *Hoffmanseggia* or two; while the Atlantic has a *Cercis* of its own, rising to the size of a forest tree, also stately trees in *Gymnocladus* and *Gleditschia* (two species), and of herbs a few species of *Cassia*.

MIMOSEÆ are in nearly similar case. Not one is truly to be reckoned in the Pacific flora or in the Rocky Mountain flora within our proper bounds, though several representatives appear a little farther south; but *Schrankia*, a *Mimosa*, a *Neptunia*, and two or three species of *Desmanthus* (all herbaceous) come within our limits on the ultra-Mississippian plains and barely enter the Atlantic flora. The shrubby or arboreal *Mimoseæ* (*Mimosa*, *Prosopis* in its two forms, *Acacia*, &c.) characterize the Texano-Mexican bordering district.

ROSACEÆ. — This important order has very characteristic North American genera. Unlike the preceding order, the western genera are more numerous than the eastern, and also about as numerous in species. Taken under their suborders or great groups—

CHRYSOBALANEÆ.—Are represented only on the Atlantic coast, and by a single *Chrysobalanus*, excluding, of course, the tropical one in Florida.

AMYGDALEÆ.—Occur in the Atlantic flora only under the true *Prunus*, *Padus*, *Cerasus*, and *Lauro-cerasus* sections, except that in Texas forms approaching *Amygdalus* occur. The Pacific flora has scanty representatives of the same types. The southern and western borders of the Great Basin are marked by two peculiar Amygdalus-like species, *Prunus Andersonii*, in which the exocarp falls from the stone in two valves like an almond, and *P. fasciculata*, on which Torrey founded a genus, *Emplectocladus*. Then, the Pacific coast has the curious and unique genus *Nuttallia*, Torr. & Gray, which is regularly pluricarpellary.

The true Rosaceæ have *Spiræa* in several types, *Neillia*, *Rubus*, *Geum*, *Fragaria*, *Potentilla*, *Agrimonia*, *Poterium*, and *Rosa*, in common over the continent, the species of *Potentilla* much increasing westward. Peculiar to the Atlantic flora are only *Neviusa* (of Japanese affinity), *Gillenia*, and *Dalibarda;* to the Pacific flora, *Chamæbatia*, which abounds over the western slope of the Sierra Nevada, and *Adenostoma*, which forms a large part of the *chaparral* or *chamisal* (the shrub is called "*Chamiso*") of the foot-hills and coast-ranges. Peculiar to the Rocky Mountain flora, mostly to the Great Basin and to its southward extension into Mexico, are *Coleogyne*, a single and very local shrub of the desert, *Cowania*, *Fallugia*. Peculiar, or nearly so, to the two western regions are *Cercocarpus* (with one Mexican species) and the two potentilliform genera or subgenera, *Horkelia* and *Ivesia*, the former of which might rather be ranked among the exclusively Pacific types. A single *Acæna* is one of the Chilian forms which has reached California. *Waldsteinia*, on the Atlantic side, is an Old World type.

POMEÆ.—The amphigæan genera or groups, *Cratægus*, *Malus*, *Sorbus*, *Amelanchier*, extend across the continent at the north, one *Sorbus* in the very same species; only *Cratægus* on the Atlantic side displays a considerable number of species; and the *Adenorachis* group is peculiar to the latter district. *Heteromeles*, of Asiatic type, is confined to the coast of California. *Peraphyllum* is a peculiar shrub of the western verge of the Great Basin.

CALYCANTHACEÆ.—Are all North American, except the single *Chimonanthus* of China; two species of *Calycanthus* peculiar to the Atlantic flora, one to that of California.

SAXIFRAGACEÆ.—An order hardly inferior to Rosaceæ in extent, in amount of diversification, and in wideness of distribution. Of the amphigæan types, headed by *Saxifraga*, it is unnecessary to discourse, except to mention that noble and most peculiar Californian species *S. peltata*. The peculiar North American genera are, on the Atlantic side, *Sullivantia* and *Decumaria;* of the Rocky Mountain flora, *Jamesia*, and farther south, *Fendlera;* of the Pacific flora, *Leptarrhena*, *Tolmiæa*, *Bolandra*, *Suksdorfia*, *Carpenteria;* of the Rocky Mountain and Pacific floras in common, *Tellima*, *Whipplea;* of the Atlantic and Pacific floras, but not in the intervening, *Boykinia;* of all three floras, *Heuchera;* of all three northward, with extension merely into Northeastern Asia, *Tiarella* and *Mitella*, also, with intervening species farther south, *Philadelphus*. Then, *Astilbe*, *Hydrangea*, and *Itea* are genera strictly divided between the Atlantic flora and that of Himalaya-Japan. In *Lepuropetalon* we have the rare case of a species peculiar to the Atlantic and the Chilian floras, with no known connection. The genus *Ribes* assumes its maximum development and fullest diversification in North America and on its western borders. Even with the alpine species included, *Saxifraga* is comparatively weak in this country.

CRASSULACEÆ.—The amphigæan genera *Tillæa* and *Sedum* are not largely represented in North America. A Mexican group, *Echeveria*, extends well north along the Pacific coast, but is wanting in the interior. *Diamorpha*, an unique genus of a single species, allied to *Sedum*, is of the Atlantic flora. *Penthorum*, equally peculiar, is of a single species, restricted to the Atlantic States and to China and Japan.

DROSERACEÆ.—Appear to be absent from the whole Rocky Mountains, except in the cool regions far north; the Pacific flora northward has the two common amphigæan species; the Atlantic flora has four peculiar species, and also rejoices in *Dionæa*.

HAMAMELIDEÆ.—Are divided between Atlantic North America, South Africa, and Asia (to which most of the genera and species belong); our single *Hamamelis* does not cross the Mississippi; the monotypic *Fother*-

gilla hardly crosses the Alleghanies; the single *Liquidambar* is equally of eastern range, though it extends into and through Mexico.

HALORAGEÆ.—Are of small account. The amphigæan *Hippuris* and one or two of *Myriophyllum* extend across the continent northward; but *Proserpinaca*, of two species, is restricted to the Atlantic flora.

MELASTOMACEÆ.—*Rhexia* of the Atlantic flora alone represents this great typical order in a temperate climate.

LYTHRACEÆ.—Largely tropical or subtropical; two or three species of *Ammannia* and *Lythrum* are of wide distribution; and the Atlantic States have a *Cuphea* and a *Nesæa*, Eastern South American types. The peculiar genus *Didiplis* is nearly an aquatic *Ammannia*.

ONAGRACEÆ.—A largely American order. *Epilobium*, a cosmopolitan genus, is most diversified in the Pacific flora. *Clarkia*, *Boisduvalia*, *Eulobus*, *Eucharidium*, and *Heterogaura* are restricted to it; *Zauschneria*, *Gayophytum*, and the principal wealth of the great genus *Œnothera*, to the Rocky Mountain and Pacific region; *Gaura* and *Stenosiphon* mainly to the great plains east and southeast of the Rocky Mountains. *Ludwigia* and the diurnal yellow-flowered *Œnotheræ*, with clavate capsules, are Atlantic types. *Godetia* is one of the most characteristic of Pacific-coast genera, but also Chilian.

LOASACEÆ.—Are wholly American, with the odd exception of a South African genus of a single species. It is wanting from the Atlantic flora, but well represented in the Rocky Mountain and Pacific floras by various species of *Mentzelia*. The most showy vespertine species, *M. ornata* and *M. nuda*, are very characteristic on the plains between the Mississippi and the Rocky Mountains. *Eucnide* and *Petalonyx* are Texano-Arizonian genera.

TURNERACEÆ.—Tropical plants; one or two species of *Turnera* on the southern borders of the Atlantic flora.

PASSIFLORACEÆ.—Are equally unknown to the Rocky Mountain and Pacific floras. A very few species of *Passiflora* are indigenous to the Atlantic States, one extending as far north as Ohio.

CUCURBITACEÆ.—Are few in this country, and from the interior region within our proper limits they are absent. The true *Echinocystis* is peculiar to the Atlantic States; two or three species of *Megarrhiza* characterize the Pacific flora; perennial and tuberous rooted species of *Cucurbita* belong to the plains east of the Rocky Mountains (*C. perennis*) and through drier Texano-Arizonian regions.

DATISCACEÆ.—A single *Datisca* in California, far away from all its relatives.

CACTACEÆ.—Are abundant in and characteristic of the Rocky Mountain region, and still more of the Texano-Arizonian, as of the Mexican plateau. Two species of *Opuntia* extend along the Atlantic coast to New England. Twenty-six species are enumerated in the Botany of California, but a majority of them belong to the Arizonian district.

FICOIDEÆ.—Are extremely few and uninteresting. The early naturalization and great abundance of *Mesembrianthemum* on the coast of California is somewhat wonderful.

UMBELLIFERÆ.—This great order of over 150 genera is not notably large in North America. The number of genera in the Atlantic and the Pacific floras is about the same, but the species of the latter are much more numerous, and the interior region is equally well supplied. The largest western genera are *Cymopterus* and *Peucedanum*, the former peculiar to the region. *Phellopterus*, a plant of the northern Pacific seacoast, is also on the coast of Japan. *Angelica Gmelini* is common to the two, also to the mountains and the sea-shore of Northern New England. *Cryptotænia* of the Atlantic flora is identically the same in Japan. *Osmorrhiza* consists of two Atlantic species, two Rocky Mountain and Pacific, and one of Japan, all closely related. *Crantzia lineata*, a little plant of the Atlantic States seaboard, occurs on the border of Mexico and in South America, and again on the seaboard of Chili and Patagonia, on the Falkland Islands, and even in New Zealand and Australia.

ARALIACEÆ.—Are few in North America, but interesting for distribution. Apparently there are none at all in the whole Rocky Mountain region, except one in Southern New Mexico. There are only two in the Pacific flora; one of them is very close to the Atlantic *Aralia racemosa* and is Californian; the other, *Fatsia horrida*, forms an undergrowth in the Coniferous woods of the coast farther north, and is also in the northern part of Japan. The Atlantic flora contains *Aralia spinosa*, the *A. racemosa* already mentioned, *A. hispida*, *A. quinquefolia*, the American Ginseng, and *A. trifolia*. Nearly all of these have close representatives in the Northeastern Asian (and Himalayan) region and not elsewhere.

CORNACEÆ.—Are of equally interesting distribution. Of the ordinary Cornels, four Pacific species are thought to be distinct from the seven of the Atlantic flora, although the characters are not very well made out, and they meet more or less in the Rocky Mountains. Then, California only has a species (*C. sessilis*), of the European and Japanese *C. mas* type. *C. florida* of the Atlantic flora has a more showy representative in *C. Nuttallii* of the Pacific forest, and less close relatives in Eastern Asia. The herbaceous *C. Canadensis* crosses the continent at the north, and in Japan meets the allied *C. Suecica*. *Nyssa*, of the Atlantic flora, has congeners in the mountains of Asia, while *Garrya* of the Pacific flora has them in the Texano-Mexican region and the West Indies.

CAPRIFOLIACEÆ.—Of the amphigæan genera there is little to remark, except the considerable development of *Viburnum* in the Atlantic flora in species strictly cognate if not sometimes identical with those of Japan; their absence from the Rocky Mountains, except well northward, where two cross to the northwest coast; and the occurrence on the Pacific side of only one endemic species. *Symphoricarpus*, a wholly American genus, has one or two species common to all three floras, one or two peculiar to each, in the central region a peculiar Mexican type. *Triosteum* is confined to the Atlantic flora and to Northeastern Asia, with the Himalaya.

RUBIACEÆ.—This vast order of over 300 genera and 4,000 species forms an insignificant feature in North America, and in the northern temperate zone throughout. But the poverty of the Rocky Mountain and the Pacific floras is extreme. There are some species of *Galium* in all, and *Cephalanthus* is on both sides of the continent and of southern extension. Besides, the Pacific flora has only the peculiar monotypic genus *Kelloggia*, with no near relative in the northern hemisphere. The Atlantic flora nearly monopolizes the genuine species of *Houstonia*, and its specially characteristic genus is *Mitchella*, which is repeated in a very similar species in Japan.

VALERIANACEÆ.—A small family, is here unimportant. The only peculiar genus is *Plectritis* of the Pacific coast and that of Chili.

COMPOSITÆ.—No detailed analysis can be expected here of the distribution of an order which is thought to make up one-tenth of flowering plants and which composes a still larger proportion of those of North America. Yet a few points may be brought to view, taking the tribes separately.

VERNONIACEÆ.—Are known only in the Atlantic region, the principal genus, *Vernonia*, however, extending over the prairie border of the plains. *Stokesia* is one of those strictly peculiar genera of a single species with which the Atlantic flora abounds.

EUPATORIACEÆ.—This is almost an American tribe, the maximum in South America, the minimum in our Pacific Territory, which has only four or five species. But into the Rocky Mountains and the Great Basin extends, more largely than into the Pacific flora, the genus *Brickellia*, founded on an outlying species of the Atlantic flora, yet mainly a Texano-Mexican genus. But the Atlantic flora is better supplied, and with peculiar genera, viz, *Sclerolepis*, *Trilisia*, *Carphephorus* (the South California species is hardly congeneric), the fine and rather large genus *Liatris*, which, however, reaches nearly to the Rocky Mountains and into Mexico, and *Kuhnia*, which is in the same case. *Garberia* of Florida, taken from *Liatris*, is too southern to be properly counted. The great genus *Eupatorium* is also well represented on the Atlantic side, and here only is the northern extension, in a single species, of the huge South American genus *Mikania*.

ASTEROIDEÆ.—Are eminently American, and in no other single district are they so numerous as in the belt across the continent which is under consideration. *Aster*, *Solidago*, and *Bigelovia* are the great genera; *Aplopappus*, *Chrysopsis*, *Erigeron*, and *Townsendia* are next in importance. About four-fifths of the *Asters* and *Solidagos* belong to the Atlantic flora, with some extension into the plains beyond, and there also are more species and forms (but fewer individuals) of *Chrysopsis;* the amphigæn genus *Erigeron* has its fullest dêvelopment and diversification in our western regions; *Aplopappus* is divided between our Rocky Mountain flora (with southward extension and into that of the Pacific) and that of Chili. *Townsendia* and *Bigelovia* are the most characteristic genera of the whole

Rocky Mountain region, although a few species of the latter reach the Pacific, while the original one belongs to the Atlantic coast. *Grindelia* and *Gutierrezia* are equally characteristic over the plains and quite over to the Pacific, and both are sparingly represented in extratropical South America. *Lessingia*, *Corethrogyne*, and *Pentachæta* are peculiarly Californian. *Boltonia* and the *Bellis integrifolia* are peculiarly Atlantic. *Baccharis*, with an immense development in South America and Mexico, has penetrated northward on both coasts to about latitude 41°, eastward in a single, westward in very few species.

INULOIDEÆ.—Are sparingly represented in America, and mostly in the Gnaphalineous type. They are particularly few in the Atlantic flora, and increase in number and diversification westward.

HELIANTHOIDEÆ.—On the contrary, are mostly American, and largely North American. Here are almost all the true species of *Helianthus*, the perennials mainly Atlantic, the annuals more western. The Atlantic flora is characterized by *Silphium*, *Chrysogonum*, *Tetragonotheca*, *Echinacea*, and the greater part of *Rudbeckia* and *Coreopsis*, and it alone has a *Heliopsis*; the eastern plains have *Thelesperma* (more developed farther south, and reproduced in Buenos Ayres!), *Engelmannia*, most of *Berlandiera*, &c.; the Rocky Mountains, *Balsamorrhiza*, *Wyethia*, *Helianthella*, &c., which they share with the Pacific flora; the latter reproduces the Coreopsoid type in *Leptosyne* and *Pugiopappus*.

GALINSOGEÆ and MADIEÆ.—Being exclusively American (and Hawaiian), and more related to the following than to the preceding tribe, deserve separate mention. *Baldwinia* and *Marshallia* are peculiar to the Atlantic flora; *Blepharipappus* to the Pacific. The rest are *Madieæ*, and are specially characteristic of our Pacific flora—are peculiar to it, indeed, except for the two Hawaiian Island genera, for the extension of the common *Madia* into Chili, and for the eastward extension of some species into the plains. *Madia*, *Layia*, and *Hemizonia*, in numerous species, many of them showy, are predominant Compositæ in California.

HELENIOIDEÆ (including the groups assigned to this tribe by Bentham).—Are specially American, are few in the Atlantic flora (where the few representatives are all of western types), are more numerous and characteristic in and towards the Rocky Mountains, while beyond them, as well as south of them and on the Pacific coast, they attain their fullest development. We will not enumerate the numerous mostly endemic genera.

ANTHEMIDEÆ.—Chiefly of the Old World; would be most insignificant in North America except for the number of naturalized weeds and for the remarkable development of species and individuals of *Artemisia*, especially of those which compose the Sage-brush on either side of the Rocky Mountains. These have already been spoken of. For anything like this development, as well as of the Chenopodiaceæ, which accompany the Wormwoods, only corresponding parts of Northern Asia can be looked to.

SENECIONIDEÆ.—Somewhat equally distributed over the world; offer little for remark. There is no peculiar type in the Atlantic flora nor east of the Rocky Mountains, but beyond them *Tetradymia* and *Psathyrotes* are truly characteristic of the Great Basin; *Raillardella* (the relatives of which are only in the Sandwich or Hawaiian Islands) is peculiar to the high Sierra Nevada, and *Luina* to the Pacific coast ranges. Western North America is, morever, the headquarters of *Arnica*.

CYNAROIDEÆ.—Are restricted to *Cnicus*, of which the Atlantic States, the Rocky Mountains and their accessory western ranges, and the Pacific side of the continent have about an equal and a moderate number of species (more or less peculiar), and the showy *Centaurea Americana*, now well known in cultivation, which inhabits the plains of Arkansas and Texas.

MUTISIACEÆ (including all the *Bilabiatifloræ* of De Candolle).—Affect the southern hemisphere, but come into a temperate region both in North America and Asia. In the former most are of the Texano-Arizonian district—*Leria*, *Trixis*, *Perezia*—and are outliers of the Mexican flora; but one of the latter genus fairly reaches California, and the original *Chaptalia* is of the Atlantic Southern States.

CICHORACEÆ, or the *Liguliforæ*.—A very moderate number of the sixty genera are indigenous to North America. *Apogon*, *Krigia*, and *Cynthia* are peculiar to the Atlantic flora or its borders, *Pyrrhopappus* to this and the nearer parts of Mexico, and *Nabalus* has only one extraneous northwestern species; but the open western country nourishes the greater part of our representatives of this tribe. From the plains to the Pacific spreads the genus *Troximon*, accompanied by *Lygodesmia* and *Stephanomeria*, and even by *Malacothrix; Glyptopleura*, *Anisocoma*, and mainly *Calycoseris* are peculiar types in the Great Basin; and fifteen species of *Malacothrix* are peculiar, or nearly so, to the Pacific flora, which has also *Rafinesquia*, *Apargidium*, and *Phalacroseris*. The paucity of the large and difficult Old World genus *Hieracium* in America is a wonder and a relief to botanists.

LOBELIACEÆ.—*Lobelia* is essentially wanting from the Pacific and the Rocky Mountain floras, but well represented in that of the Atlantic. Instead, the Pacific flora is characterized by four peculiar genera, *Downingia*, *Howellia* (an aquatic plant of Oregon), *Palmerella*, and the curious *Nemacladus*. It has also a peculiar *Laurentia*, which extends eastward to the Rocky Mountains, where it is the only representative of the family.

CAMPANULACEÆ.—Are not numerous; but *Campanula* has a few representatives in all three floras (in the interior only on the mountains); *Specularia* has fewer; and two genera of single species, *Githopsis* and *Heterocodon*, are peculiar to the Pacific flora.

ERICACEÆ.—This important order needs to be considered under its suborders.

VACCINEÆ.—In the northern hemisphere affect the eastern side of continents. The five species of *Gaylussacia* (Huckleberries), and the dozen or more eastern endemic species of *Vaccinium*, as also the peculiar genus *Chiogenes*, sparingly enter even the eastern part of the Mississippi Valley. Only amphigæan types occur in the Rocky Mountains and in the alpine or alpestrine region. The moister parts of the Pacific coast nourish two or three species of *Vaccinium*, but no other forms; yet all the Atlantic types, except *Gaylussacia*, occur again in Northeastern Asia.

ERICINEÆ.—In North America are not unequally divided between the Atlantic and Pacific floras; but the interior region has very few, not one peculiar, and none except upon high mountains or of equivalent northern range. The Pacific flora is remarkable for having an *Arbutus* and ten species of *Arctostaphylos* of the Mexican type, for its solitary *Leucothoë* far away from congeners, its shrubby *Gaultheria*, and its species of *Bryanthus;* also for the peculiar *Ledum* which it shares with the Northern Rocky Mountains. It has one peculiar genus, *Cladothamnus*. The specially Atlantic Ericineous genera are *Epigæa* (yet with a Japanese counterpart), *Oxydendrum*, *Kalmia*, *Leiophyllum*, and *Elliottia*, this shared with Japan. This flora is particularly rich in *Andromedeæ* of eight or nine types, and here alone in the temperate zone we find a *Bejaria*. Only the counterpart Asiatic region excels it in *Rhododendron* and *Azalea;* yet the Pacific flora has three or four fine representatives of these. *Menziesia* in one species occurs over the breadth of the continent at the north, adding a second species on the way; thence to Japan, where there are more.

PYROLINEÆ (including *Clethra* as the type of a peculiar tribe).—The two species of the latter genus are characteristic in the Atlantic flora; they are not found west even of the Alleghanies, to which one of them is restricted. North America is the headquarters of *Pyrola* and the related genera, having nearly all the known species; and the western floras possess their full share.

MONOTROPEÆ.—Also are strikingly American, notwithstanding the wide distribution of the typical *Monotropa* from South America to Himalaya, and to Europe of *Hypopitys*. All the genera and species, except one in Himalaya, occur in North America, and all but the peculiar Atlantic genus *Schweinitzia* are in the Pacific flora, to which half the genera are peculiar.

LENNOACEÆ —A Mexican group of three genera, having the habit of *Monotropeæ;* has one genus, *Pholisma*, on the coast of California, and another very singular one, *Ammobroma*, Torr., beyond its borders at the head of the Gulf of California.

DIAPENSIACEÆ, upon which we have elsewhere dilated, consist of the arctic-alpine *Diapensia Lapponica* and a congener in Himalaya, of two monotypic genera in the Atlantic United States (*Pyxidanthera* and *Galax*), of another (*Shortia*) divided between the Alleghanies (where it is apparently verging to extinction) and Japan, of a related genus in the latter country, and of another in Tibet. From our western floras it is totally absent.

PLUMBAGINACEÆ.—In this country very few, and confined to the sea-coasts; are not noteworthy.

PRIMULACEÆ.—Need little mention, most of the genera being amphigæan and widely distributed over the country, although few in species, many of them alpine or alpestrine. The most peculiar genus, *Dodecatheon*, spans the continent in very various forms, which seem to be connected into one species. The true species of *Lysimachia* are only on the Atlantic side, and so mainly is the peculiar genius *Steironema*, although the commonest species extends northward to the Pacific.

SAPOTACEÆ.—This is one of several orders which, although mainly tropical, have temperate representatives in the Atlantic United States, where there are at least three species of *Bumelia*.

EBENACEÆ.—Are in similar case. *Diospyros Virginiana*, our Persimmon, extends north to latitude 41°, and barely crosses the Mississippi. A Texan species lies beyond our line. Westward the order is wanting.

STYRACACEÆ.—Are found on both sides of the continent, but not at all in the intermediate regions. The order is one of those that affect the eastern side of continents. Accordingly, the Atlantic flora has three genera (*Symplocos*, *Halesia*, *Styrax*) and eight species; the Pacific flora only a single *Styrax*.

OLEACEÆ.—Are fairly well represented in the Atlantic flora by six or seven species of *Fraxinus*, a few of *Forestiera*, a *Chionanthus*, and an *Osmanthus;* two species of *Fraxinus* are the sole representatives in the Pacific flora. The wide intervening region has none except a *Fraxinus*, with simple leaves, on the southern border, where also flourish one or two species of *Forestiera* and of the Texano-Mexican genus *Menodora*.

APOCYNACEÆ.—The two species of *Apocynum* make a part of all three floras; the Pacific has a peculiar genus, *Cycladenia;* the Atlantic, a plant referred to the Northeastern Asian genus *Trachelospermum*, and *Amsonia* (which is also Japanese), the latter reaching the southern borders of the Great Basin.

ASCLEPIADACEÆ—Most of *Asclepias* is North American, and the species, as to number, are not very unequally divided between the three floras, at least if New Mexico and Arizona be taken into the account. This southern frontier and the country beyond is rather rich in the order. The Pacific flora has three species nearly related to *Asclepias;* one of them is made the type of a peculiar genus, *Schizonotus*, the other two are referred to the chiefly African genus *Gomphocarpus*. The Atlantic flora divides with that of the plains up to the Rocky Mountains the genera *Acerates* and *Asclepiodora*, with tropical parts of America the genus *Enslenia*, and is also rich in *Gonolobus;* and it monopolizes the genera *Podostigma* and *Anantherix*.

LOGANIACEÆ.—As our species of *Buddleia* and the genus *Emorya* belong to the Texano-Arizonian region, it may be said that this order is here restricted to the Atlantic flora. This divides *Gelsemium* with Eastern Asia, *Spigelia* and *Polypremum* with tropical America, *Mitreola* with both.

GENTIANACEÆ.—The Gentians, generally most numerous in mountain districts, preponderate in our western floras; yet the Atlantic States do not lack species. The amphigæan genus *Erythrea* is finely represented in the Pacific flora and in the Texano-Arizonian region, sparingly in the Rocky Mountain region, while in the Atlantic States there is probably no indigenous species north and east of Arkansas. *Microcala* has probably reached California from South America. *Menyanthes trifoliata* is all around the northern part of the temperate zone. *M. crista-galli* is one of the few plants which the Pacific flora shares with that of Japan. The two species of *Limnanthemum* are strictly Atlantic, and are connected with tropical species of the eastern side of the continent. *Halenia* is at the same time a high-northern and an Andean genus. *Swertia* is absent from the Atlantic side of the continent. As to the peculiarly American genera, the finest is *Frasera*, with one Atlantic species, and a few others both of the Rocky Mountains and of the Pacific side of the continent. *Eustoma* reaches from the Texano-Arizonian region just within our border over to the eastern border of the plains. *Sabbatia*, of thirteen species, *Bartonia*, and *Obolaria* are wholly peculiar to the Atlantic flora.

POLEMONIACEÆ.—Although not wholly absent from Europe and Northern Asia, compose a truly characteristic American order, and, although half the genera are Mexican and South American, at least nine-tenths of the species must belong to the United States. Of these, an equally large proportion adorn the western regions, whether the mountains, the valleys, or the plains, under the various forms of *Gilia*, *Collomia*, and *Phlox*. Yet, to the Atlantic States belong the herbaceous perennial species of the latter genus, which have longest been known to botanists.

HYDROPHYLLACEÆ.—This is more strictly an American, and even more predominantly a Western North American, order than the preceding. A very large part of our species and forms inhabit the Rocky Mountain region, chiefly its plains and valleys, and fewest the Atlantic region. No genus is restricted to the latter, though into it only extends the southern *Hydrolea;* into the lower parts of the intermediate regions extends the mainly Texano-Mexican genus *Nama;* to it belongs *Conanthus*, *Tricardia*, and essentially *Lemmonia;* to it and to the Pacific flora belong *Emmenanthe*, *Hesperochiron*, *Eriodictyon;* to the Pacific flora alone belong *Draperia* and *Romanzoffia.*

BORRAGINACEÆ.—This is a larger order, and is found all over the world. The tribes or suborders other than the *Borrageæ* hardly come at all within our limits, excepting two or three species of *Heliotropium*, one of which is very characteristic of the plains east of the Rocky Mountains (viz, *H. convolvulaceum*, the *Euploca* of Nuttall, and it has also been found in the Great Basin), and excepting the *Tiquilia* section of *Coldenia*, which extends to the northwestern verge of the interior woodless region. The genera and species are few in the Atlantic flora. Its only characteristic genus is *Onosmodium;* the yellow-flowered and showy *Lithosperma* of the section *Batschia* it shares with the plains. The great genus of the whole Rocky Mountain flora, though shared with the Pacific, is *Eritrichium;* the characteristic genus of the Pacific flora, of which its neighbor takes a part, is *Amsinckia. Mertensia* has most of its species in the Rocky Mountains and their accessories, yet the finest of them is *M. Virginica*, peculiar to the Atlantic States. *Pectocarya* may have been brought from Chili to California. Some peculiar genera of the Arizonian flora are hardly within our scope.

CONVOLVULACEÆ.—There are no peculiar genera in North America, and nothing notable in distribution. There are many more Atlantic than Pacific species.

SOLANACEÆ.—As to truly indigenous species, are few north and east of Texas, and not numerous through the western portions of the country. *Physalis* is the largest genus. The only peculiar genera are *Chamæsaracha* and the very little known *Oryctes*, neither of salient character, both of the interior region. Into the southern part of the Rocky Mountains extend from Mexico two species or forms of the Potato type.

SCROPHULARIACEÆ.—North America has 37 indigenous genera of this very large order, several of them numerous in species. They are fewest in the Atlantic flora, which yet has some peculiar genera, and it is noteworthy that only one of them (*Schwalbea*) is of near affinity to Japano-Himalayan types. Throughout, the types which are not distinctively American are rather European, *Mimulus*, however, being an exception. Thus, in California there is a remarkable development of the genus *Antirrhinum*. Of the several tribes, there is one which is particularly characteristic of the Atlantic flora, namely, that which contains *Gerardia* (of over 20 species), and is augmented by *Macranthera*, *Seymeria*, and *Buchnera*. Some species abound on the eastern part of the plains, but none reach the Rocky Mountains or appear in the country beyond them. Of genera which are sparingly represented in the Atlantic flora or near its borders, and are in fuller strength westward, the more characteristic are *Collinsia*, and the great genus *Pentstemon*, with about 4 species at the east and nearly 40 in the Pacific flora; *Mimulus*, with 3 Atlantic and at least 23 Pacific species; *Synthyris; Castelleia*, with 3 or 4 Atlantic and about 20 western species; *Orthocarpus* with one species on the northeastern plains and 24 in the western floras, chiefly on the Pacific side, while its relatives in *Cordylanthus* add half as many more. So *Pedicularis*, with only 2 Atlantic species, increases westward to over 20.

OROBANCHACEÆ.—The four North American genera are wholly distinct from the European, and from the Asian also, except for an Eastern Asian species of *Boschniakia*. Here also, although two of the gen are wholly Atlantic and one is divided (*Aphyllon*), the Pacific species are more than twice the number of the Atlantic.

LENTIBULACEÆ.—Both *Utricularia* and *Pinguicula* are of good number and diversity in the Atlantic flora, are nearly absent from the Rocky Mountain flora, and are very few on the Pacific side.

BIGNONIACEÆ.—For a mainly tropical order, are pretty well represented in the Atlantic flora by four species belonging to three genera (and the most distinct genus, *Catalpa*, also in Japan and Northern China), but would be wholly absent from the western floras except for a Mexican shrub (*Chilopsis*) which reaches the southern borders of the Great Basin.

PEDALIACEÆ.—Are sparingly represented in the Texano-Arizonian region, but probably are not indigenous to the north of it.

ACANTHACEÆ.—An immense tropical and subtropical order, but probably without a single representative in the Rocky Mountain or Pacific floras within our limits, yet with several in the Texano-Arizonian district. But the Atlantic flora has an *Elytraria* and *Hygrophila*, one or two species of *Calophanes*, as many of *Ruellia* and of *Dianthera*, a *Dicliptera*, and a plant of a peculiar genus, *Gatesia*.

VERBENACEÆ.—Of the eleven genera enumerated in the flora of North America, only four are of such northern range as to come within our limits. *Verbena* and *Lippia* enter into all three floras. *Callicarpa* and *Phryma* are restricted to the Atlantic flora and to a solitary species. Both the latter are Eastern Asian, the *Phryma* in the same species.

LABIATÆ.—A large and important order, but after excluding the naturalized plants and those which range south of the present survey, neither the American species nor the genera are particularly numerous, nor is their distribution such as to call for much remark. They are most conspicuous in the Pacific forest in the Rocky Mountain region, most diversified in genera in the Atlantic States. Of the North American types, *Physostegia*, *Lophanthus*, *Pycnanthenum*, and *Trichostema* are common to both sides of the continent, the latter most largely on the Pacific; the latter numerously on the Atlantic side, with a single Californian species far away from its congeners. The peculiar Atlantic genera are *Isanthus*, *Cunila*, *Collinsonia*, *Conradina*, *Ceranthera*, *Blephilia*, *Monarda* (which extends into the Rocky Mountains), *Brazoria*, *Macbridea*, *Synandra*. The Pacific peculiar genera are only *Monardella*, *Pogogyne*, *Acanthomintha*, *Audibertia*, the first and the last extending eastward to the Rocky Mountains in single species. *Hedeoma* is a remaining characteristic genus, with headquarters in the Texano-Mexican district, extending over the eastern plains, and one species to the Atlantic. The great genus *Salvia* is meager on both sides of the continent, almost absent from the interior, except on the eastern plains toward the south, but fairly numerous in species throughout the Texano-Arizonian region.

PLANTAGINACEÆ.—Are few in species. *Plantago Patagonica*, which abounds on the plains and on the Pacific coast southward, is very polymorphous and of immense geographical range. It is worth noting here that the other genus, *Littorella*, till now supposed to be wholly European, has been detected at three or four stations within and near the northern borders of the United States.

NYCTAGINACEÆ.—Are essentially absent from the Atlantic flora, abundant in the Texano-Arizonian; are represented by *Oxybaphus* on the plains east of the Rocky Mountains and by *Abronia* beyond them; also by *Quamoclidion* or *Mirabilis* with several-flowered calciform involucre. The Great Basin has a peculiar genus, *Hermidium* of S. Watson, allied to *Bougainvillæa* of South America, but herbaceous.

AMARANTACEÆ (weeds excluded).—Are chiefly of the Rocky Mountain region in its warmer and drier parts. *Acnida*, however, is more eastern.

CHENOPODIACEÆ.—Are of similar distribution, but far more numerous and diverse. They are the most characteristic and abundant of the plants of the dry interior region, as has been elsewhere stated, and they naturally extend into the Pacific flora more than into the Atlantic. *Atriplex* is the great genus. *Grayia* and *Sarcobatus* are the endemic shrubby genera. *Spirostachys* is of an extratropical South American type. *Cycloloma* and *Suckleya* are herbs peculiar to the eastern plains.

PHYTOLACCACEÆ.—Are represented only in the Atlantic flora, and by a single *Phytolacca*, *Rivina* belonging farther south.

POLYGONACEÆ.—The genuine *Polygoneæ* on the Atlantic and Pacific sides by *Polygonum* and *Rumex*, and by *Polygonella* in the southern part of the former; and there are a few in the interior, where *Rumex venosus* is a characteristic plant. But the most characteristic plants of the two western floras, and the most numerous in species, if not in individuals, are the *Eriogoneæ*. The genus *Eriogonum*, founded at the beginning of the century upon the single-known and still the only Atlantic species, now comprises nearly 100 species in our western floras, and the subsidiary genera (*Oxytheca*, *Centrostegia*, *Chorizanthe*, *Nemacaulis*, *Hollisteria*, and *Lastarreia*, all mainly Californian, and three of them also Chilian) about three score more. *Pterostegia*, of California, proves to be most related to the arctic-alpine *Kœnigia*. Another type is represented in the southern part of the Atlantic flora by the peculiar genus *Brunnichia*.

PODOSTEMACEÆ.—Aquatic plants of tropical or subtropical rivers, mostly of the southern hemisphere. A single *Podostemon*, on which the genus and order were founded, belongs to the Atlantic United States. Its congeners are all in Brazil, Madagascar, and India!

ARISTOLOCHIACEÆ.—Absent from the whole intermediate region, there are three species of *Asarum* in the Atlantic and three others in the Pacific flora; three of *Aristolochia* in the former and one in the latter.

PIPERACEÆ, tribe *Saurureæ*.—A *Saururus* in the Atlantic flora, the only other one Chino-Japanese; a *Houttuynia* (if not a good genus, *Anemiopsis*) in California and thence to Mexico; its relatives also East African.

LAURACEÆ.—Mainly tropical or subtropical all around the world, yet there are three genera in the Atlantic flora (one, *Sassafras*, a fine tree, and all of Asiatic affinities) and a peculiar one in California.

THYMELÆACEÆ.—Most developed in the southern hemisphere. In North America is only *Dirca*, one species in the Atlantic flora, the other, very local, in the Californian.

ELÆAGNACEÆ.—Two of the three genera of this little order are North American. The two species of *Shepherdia* nearly traverse the continent at the north, and a third species has been discovered on the southern rim of the Great Basin. An *Elæagnus* belongs to Rocky Mountain region.

LORANTHACEÆ.—Are represented by two genera, allied to *Viscum*. *Phoradendron* is peculiar to America. The common species in some its of forms traverses the continent; another belongs to the Californian district and adjacent parts; the others are more southern. *Arceuthobium* is amphigæan, of three or four American species, mostly Pacific or southern, one sparingly represented in the Northern Atlantic States.

SANTALACEÆ.—Are most largely of the southern hemisphere. The distribution of our four genera is interesting. *Comandra* consists of a European species, two North American ones, which traverse the continent northward, and a fourth, which belongs mainly to the Rocky Mountain region southward. *Buckleya* consists of an Atlantic (Alleghanian) species and one in Japan; *Darbya* of a single and local Atlantic species, of some ambiguity, because the female plant is unknown; *Pyrularia* of an Alleghanian species and a Himalayan.

EUPHORBIACEÆ.—An immense order of 3,000 species and, at the least, 200 genera. The world-wide and prolific genus *Euphorbia* is very moderately represented in the Atlantic flora, sparingly in the Pacific, numerously in the drier parts of the intermediate country, especially southward. The other large and non-peculiar genera are mainly southern in range. Peculiar genera are very few—*Eremocarpus* in the Pacific flora; *Crotonopsis* in the Atlantic. Of the *Buxineæ*, there is *Simmondsia* on the Californian coast, of no near affinity; *Pachysandra*, in the Alleghanies, which has a congener in Japan.

EMPETRACEÆ.—Have all three genera in the Atlantic flora, and not elsewhere—*Empetrum* alpine and northern; *Corema* on the coast of the United States, the other species on the opposite Atlantic coast in Portugal; *Ceratiola* in the Southern Atlantic States.

CERATOPHYLLEÆ.—Probably of a single species, amphigæan, both Atlantic and Pacific.

URTICACEÆ.—Taken in the large sense, may be referred to under their suborders.

URTICEÆ.—Are few on either side of the continent; nearly absent from the Rocky Mountains and Great Basin, an *Urtica* or two, and the same of *Parietaria; Hesperocnide* is divided between California and the Hawaiian Islands; *Laportea*, of the Atlantic States, has its congeners mainly in Eastern Asia. The solitary North American *Pilea* is confined to the Atlantic States, and the same of *Bœhmeria*.

ULMACEÆ.—There are four fine Elm trees in the Atlantic flora, and one farther southwest, also the *Planera;* none of these in the Rocky Mountain or the Pacific floras; *Celtis*, either a form of the common eastern or a peculiar species, extends into the Rocky Mountains and even to Oregon.

CANNABINEÆ.—The common Hop of the Old World is indigenous in the Atlantic States and in the Rocky Mountains; the other species is Chino-Japanese.

MOREÆ.—*Morus rubra* is of the Atlantic States, extending far southward and thence westward, perhaps passing into a small-leaved species. *Maclura aurantiaca*, the Osage Orange, belongs to the northwestern borders of the Atlantic district. None in the western floras.

PLATANACEÆ.—There is one Atlantic and one Californian *Platanus*; but none intervening, except on the Mexican borders.

LEITNERIEÆ.—The anomalous *Leitneria*, of Florida, is of a single species, of wholly obscure affinity.

JUGLANDACEÆ.—*Juglans cinerea* and *J. nigra* or the Walnut trees of the Atlantic flora, *J. California* of the Pacific; *Carya* is of seven species, restricted to the Atlantic flora.

CUPULIFERÆ.—Are most fully represented in the Atlantic flora, are prominent in the Pacific flora, but are wanting in the whole interior region, excepting a Scrub Oak or two on the Rocky Mountains and their accessories. There are twenty-one Oaks, two Chestnuts, and a Beech in the Atlantic flora; nine Oaks and a *Castanopsis* in the Pacific flora; one Oak in the Rocky Mountain flora, or perhaps more than one; and two or three others in the district between it and Mexico.

CORYLACEÆ.—An *Ostrya* and a *Carpinus* and two species of *Corylus* represent this group in the Atlantic flora. The two western floras want all but one of the latter, which traverses the continent.

BETULACEÆ.—Are represented in the Atlantic flora by seven Birches and three Alders. One of the smaller Birches and perhaps one of the Alders, extends over to the Pacific flora, along with another Rocky Mountain Birch, and two or three Alders are added.

MYRICACEÆ.—The amphigæan *Myrica Gale* is of the Atlantic flora; one very like it in the Pacific. Of the Bayberry *Myricæ*, there are one or two on the Atlantic, and another on the Pacific coast. The *Comptonia* is peculiar to the Atlantic flora.

SALICINEÆ.—There are about fifteen Willows indigenous to the Atlantic States, nineteen in the Californian flora, very few of them identical; the Rocky Mountains have a few of these and one or two more of alpine type. There are six Poplars in the Atlantic States; three or four in California and Oregon; one or two in the intermediate country, besides *P. tremuloides*, which, passing along the mountains, is common to all three floras.

The *Gymnospermeæ* may best be exibited under the particular groups.

GNETACEÆ.—*Ephedra*, the only extratropical genus, is absent from the Atlantic flora, has three or four species in the Texano-Arizonian region, two of which enter the Great Basin, and one belongs to the southern part of California.

TAXINEÆ are absent from the Rocky Mountain flora. The Atlantic flora has the depressed *Taxus Canadensis* at the north, and an upright arborescent and perhaps peculiar species in the northern part of Florida. There is a similar one in the woods of the Pacific side of the continent. The Atlantic flora possesses the original *Torreya;* California another; the two remaining species are of Northeastern Asia.

CUPRESSINEÆ.—The amphigæan *Juniperus communis* traverses the continent at the north; and a prostrate form of *J. Sabina* probably does the same; also *J. Virginiana*, the eastern Red Cedar. But on a southern range the latter species hardly passes out of the Atlantic region. *J. occidentalis* and *J. Californica* are the characteristic species of the mountains bordering and traversing the southern part of the Great Basin and of California. *Cupressus* is wanting to the Atlantic and to the Rocky Mountain floras, but there are three species in the Pacific flora. *Chamæcyparis* is of one species in the Atlantic flora, two in the Pacific, the remainder in Japan. *Thuja* is of two species, one of the Atlantic flora, the other of the Pacific and of Japan. *Libocedrus* is represented by a peculiar species only in the Pacific flora.

TAXODINEÆ.—Of *Taxodium distichum*, in the Atlantic flora; *Sequoia gigantea* and *S. sempervirens*, the Big Trees and Redwoods, in California.

ABIETINEÆ.—Are more numerous in North America than elsewhere. Like the preceding, they prefer the sides to the center of the continent, yet are not wanting to the mountains of the latter. *Pinus* is represented in the Atlantic flora by twelve species; in the Rocky Mountains and those of the Great Basin by six different species, not counting those of Arizona; in the Pacific flora by eleven species, four of which are in the preceding flora. *Larix* has a single Atlantic and two Pacific species, one or both of which occur in the Northern Rocky Mountains. *Picea*, the Spruces, two in the Atlantic, two others in the Rocky Mountain, and two in the Pacific flora, one of the latter a Rocky Mountain species. *Tsuga*, one (Hemlock Spruce) in the Atlantic, and one almost the same in the Pacific flora, which has also the peculiar *T. Pattoniana* or *Williamsonii*. *Pseudotsuga Douglasii*, of the Pacific and the Rocky Mountain flora, most abundant in Oregon. *Abies*, the Firs or Balsam Firs, two in the Atlantic, two in the Rocky Mountain, and four or five in the Pacific flora, one of them common?

CYCADACEÆ.—Being represented only by a *Zamia* on the peninsular part of Florida, are beyond our limit.

The monocotyledonous orders must be more briefly dispatched.

PALMEÆ.—Are represented on the Atlantic coast and north of the Florida peninsula by four species in two genera. Three species in two genera are described in the Botany of California; but two of them are known only beyond the United States boundary; the other belongs properly to the Arizonian flora.

ARACEÆ.—Absent from the whole interior region; represented by seven genera in the Atlantic flora, of which *Peltandra* and *Orontium* are peculiar, and *Symplocarpus*, except that it is reproduced in Japan; on the Pacific coast only a relative of the latter, *Lysichiton*, of which the same species occurs in Japan.

LEMNACEÆ, TYPHACEÆ.—Both nearly the same on the two sides of the continent.

NAIADACEÆ.—In similar case, except that the Pacific coast adds *Lilæa* and *Phyllospadix*.

ALISMACEÆ.—Not dissimilar, except that the Atlantic flora has several species of *Sagittaria* and the Pacific only one, but it has the European type of *Damasonium*.

HYDROCHARIDACEÆ.—The Atlantic flora possesses *Limnobium* and *Vallisneria* as well as *Anacharis*; the Pacific, only *Anacharis*; the intermediate region none.

BURMANNIACEÆ.—Two Atlantic genera and species of South American affinity; none in the western floras.

ORCHIDACEÆ.—Are much fewer in the Pacific flora than in the Atlantic, and are wanting in the intermediate region, except on the mountains, and there in mostly amphigæan species. The Atlantic flora has the peculiar genera *Tipularia* and *Arethusa* (but the latter is in Japan), and some peculiar *Habenariæ*; the Pacific possesses two European genera, *Cephalanthera* and *Epipactis*, but the latter is also in Texas, and an European species of it has recently been detected in the State of New York.

CANNACEÆ.—Two genera and three species in the southern part of the Atlantic flora only.

AMARYLLIDACEÆ.—Are represented in the Atlantic flora by five genera, none of them peculiar, and several species. There are none in the two western floras except *Agave*, and those of Mexican type, and only along the southern border.

HÆMODORACEÆ.—Three genera, all strictly peculiar to the Atlantic States.

BROMELIACEÆ.—*Tillandsia* only along the Atlantic coast; one species north to Virginia; others in Florida and its northern border.

IRIDACEÆ.—Two peculiar genera in the Atlantic flora or its borders, besides *Iris* and *Sisyrinchium*, which are more numerous in the Pacific flora; the former along the mountains between.

DIOSCOREACEÆ.—A single *Dioscorea*, in the Atlantic flora only.

SMILACEÆ.—A dozen species of *Smilax* in the Atlantic flora; one of them barely reaches the Rocky Mountains; a single and peculiar species in California.

ROXBURGHIACEÆ.—*Croomia*, a single species, in the Southern Atlantic States; a close congener in Japan; all other relatives Asiatic.

LILIACEÆ.—Here taken in the extended sense, are largely represented (by twenty-four genera) in the Atlantic flora; are not very few in the

Rocky Mountain region, yet of few genera; and are remarkably developed and diversified in the Pacific flora, which has thirty-three genera, several of them peculiar. Only eleven of the forty North American genera are European, but several of those otherwise peculiar are shared with Eastern Asia, especially the *Melanthieæ*. The characteristic features of the Liliaceous vegetation of the two western floras are given by the endemic genera, *Brodiæa* and relatives, *Leucocrinum*, *Chlorogalum*, *Calochortus*, &c., by *Yucca*, which is also Atlantic, and by the great development of the genus *Allium*, exceeded only in Northern Asia.

JUNCACEÆ.—Are numerous and well distributed over the continent, but require no special remark.

PONTEDERIACEÆ.—Tropical aquatics, except the three genera of the Atlantic flora, one of which (*Schollera*) reappears in its single species on the Pacific coast.

COMMELYNACEÆ.—Also mainly tropical; are represented by two genera and several species in the Atlantic flora; one or two of these barely reach the Rocky Mountains southward; all are absent from the Pacific flora.

XYRIDACEÆ.—*Mayaca*, a South American aquatic, and sixteen species of *Xyris* are characteristic of the Atlantic flora; are wanting to the others.

ERIOCAULONEÆ.—Chiefly Atlantic South American; are of three genera and several species in the Atlantic flora, but none at all western. The remarkable thing is that the most northern *Eriocaulon* has effected a lodgment on the coast of the British Islands.

CYPERACEÆ.—The number of species and genera in the Atlantic flora is nearly double that of the Pacific, and the Rocky Mountain flora has few.

GRAMINEÆ, which would be well worth a particular analysis, are more equally divided, at least as to genera. Of these the western floras have many, chiefly of Texano-Arizonian and Mexican types, which are unknown at the east. The Atlantic flora possesses a few peculiar genera, *Zizania*, *Brachyelytrum*, *Monanthochloa*, *Hydrochloa*, *Ctenium*, *Oryzopsis*, *Graphephorum*, *Diarrhena* (reproduced in Japan?), *Gymnostichum*, *Tripsacum*.

It is hardly worth while to extend this survey into the Cryptogamia, even to the Ferns.

The subjoined tabular view of the Phænogamous orders presents to the eye some of the facts which the preceding pages have brought out as regards respectively their presence or absence or their relative importance in the three floras which we have been comparing. The name in full capitals indicates that the order or group has its headquarters in the flora of that column. Small capitals indicate a full or a notable representation, at least comparatively. The name in ordinary Roman letters indicates a more or less considerable representation; in italic type, a less or scanty representation; the initial with a dash (as N——— in the sixth line), indicates a feeble representation; the blank means that the order is not indigenous to that flora. Thus, the second, third, and fourth orders are not represented, so far as we know, in the Rocky Mountain and the Pacific floras, *i. e.*, they do not extend westward beyond the Atlantic forest region. The next line declares that the order *Berberidaceæ* is, considering the size of the order (in this instance small), richly represented in the Atlantic flora, sparingly in that of the Rocky Mountains (inclusive of the plains on the east and the desert basin on the west), more numerously in that of the Pacific district. *Nymphæaceæ* are in the same case, having very full generic representation in the Atlantic flora but hardly any in that of the Rocky Mountains, and a little more on the Pacific side of the continent. *Sarraceniaceæ* take full capitals in the first column, not that the species or types are numerous, but because the few and remarkable Sarracenias represent the whole order, excepting two species; one of them is in California, and the Pacific column is entered accordingly, Such a presentation is only approximate, but in a general way it tells the story.

Atlantic Flora.	Rocky Mountain Flora.	Pacific Flora.
Ranunculaceæ.	Ranunculaceæ.	Ranunculaceæ.
MAGNOLIACEÆ.		
Anonaceæ.		
Menispermaceæ.		
BERBERIDACEÆ.	*Berberidaceæ.*	Berberidaceæ.
NYMPHÆACEÆ.	N——.	*Nymphæaceæ.*
SARRACENIACEÆ.		*Sarraceniaceæ.*
Papaveraceæ.	P——.	PAPAVERACEÆ.
Fumariaceæ.	*Fumariaceæ.*	Fumariaceæ.
Cruciferæ.	Cruciferæ.	Cruciferæ.
Capparidaceæ, CLEOMEÆ.	Capparidaceæ, CLEOMEÆ.	Capparidaceæ, **Cleomeæ.**
Cistaceæ.		C——.
Violaceæ.	*Violaceæ.*	Violaceæ.
Polygalaceæ.	P——.	P——.
K——.	Krameriaceæ.	K——.
	Frankeniaceæ.	Frankeniaceæ.
Caryophyllaceæ.	Caryophyllaceæ.	Caryophyllaceæ
ILLECEBRACEÆ.	Illecebraceæ.	*Illecebraceæ.*
Portulacaceæ.	PORTULACACEÆ.	PORTULACACEÆ
Elatinaceæ.	Elatinaceæ.	Elatinaceæ.
HYPERICACEÆ.		*Hypericaceæ.*
Ternstrœmiaceæ.		
Malvaceæ.	Malvaceæ.	Malvaceæ.
		Bombaceæ.
Tiliaceæ.		
Linaceæ.	*Linaceæ.*	Linaceæ.
	Zygophyllaceæ.	
Geraniaceæ proper.	*Geraniaceæ.*	*Geraniaceæ.*
Limnantheæ.		LIMNANTHEÆ.
Oxalideæ.	*Oxalideæ.*	*Oxalideæ.*
Balsamineæ.		
Rutaceæ.	R——.	R——.
CYRILLEÆ.		
Aquifoliaceæ.		
Celastraceæ.	C——.	*Celastraceæ.*
Rhamnaceæ.	Rhamnaceæ.	RHAMNACEÆ.
VITACEÆ.	V——.	*Vitaceæ.*
SAPINDACEÆ.	*Sapindaceæ.*	*Sapindaceæ.*
ANACARDIACEÆ.	*Anacardiaceæ.*	Anacardiaceæ.
PAPILIONACEÆ.	Papilionaceæ.	PAPILIONACEÆ.
Cæsalpineæ.	C——.	C——.
Mimoseæ.	*Mimoseæ.*	
Chrysobalaneæ.		
Amygdaleæ.	*Amygdaleæ.*	*Amygdaleæ.*
Rosaceæ propriæ.	Rosaceæ.	Rosaceæ.
Pomeæ.	*Pomeæ.*	*Pomeæ.*
CALYCANTHACEÆ.		Calycanthaceæ.
SAXIFRAGACEÆ.	Saxifragaceæ.	SAXIFRAGACEÆ.
Crassulaceæ.	*Crassulaceæ.*	Crassulaceæ.
DROSERACEÆ.	D——.	D——.

Atlantic Flora.	Rocky Mountain Flora.	Pacific Flora.
Hamamelideæ.		
Halorageæ.	H——.	H——.
Melastomaceæ.		
Lythraceæ.	L——.	L——.
Onagraceæ.	ONAGRACEÆ.	ONAGRACEÆ.
	LOASACEÆ.	Loasaceæ.
Turneraceæ.		
Passifloraceæ.		
Cucurbitaceæ.	*Cucurbitaceæ.*	*Cucurbitaceæ.*
Cactaceæ.	CACTACEÆ.	Cactaceæ.
Ficoideæ.	*Ficoideæ.*	F——.
Umbelliferæ.	UMBELLIFERÆ.	UMBELLIFERÆ.
Araliaceæ.		*Araliaceæ.*
Cornaceæ.	*Cornaceæ.*	Cornaceæ.
Caprifoliaceæ.	*Caprifoliaceæ.*	*Caprifoliaceæ.*
Rubiaceæ.	*Rubiaceæ.*	*Rubiaceæ.*
Valerianaceæ.	*Valerianaceæ.*	Valerianaceæ.
Vernoniaceæ.		
Eupatoriaceæ.	*Eupatoriaceæ.*	Eupatoriaceæ.
Asteroideæ.	Asteroideæ.	*Asteroideæ.*
Inuloideæ.	*Inuloideæ.*	Inuloideæ.
Helianthoideæ.	Helianthoideæ.	*Helianthoideæ.*
Galinsogeæ.	G——.	G——.
	Madieæ.	MADIEÆ.
Helenioideæ.	HELENIOIDEÆ.	HELENIOIDEÆ.
Anthemideæ.	Anthemideæ.	Anthemideæ.
Senecionideæ.	Senecionideæ.	Senecionideæ.
Cynaroideæ.	*Cynaroideæ.*	*Cynaroideæ.*
Mutisiaceæ.	*Mutisiaceæ.*	M——.
Cichoraceæ.	Cichoraceæ.	Cichoraceæ.
Lobeliaceæ.	*Lobeliaceæ.*	LOBELIACEÆ.
Campanulaceæ.	*Campanulaceæ.*	*Campanulaceæ.*
VACCINEÆ.	*Vaccineæ.*	*Vaccineæ.*
ERICINEÆ.	*Ericineæ.*	Ericineæ.
PYROLINEÆ.	*Pyrolineæ.*	*Pyrolineæ.*
MONOTROPEÆ.	*Monotropeæ.*	MONOTROPEÆ.
		Lennoaceæ.
DIAPENSIACEÆ.		
Plumbaginaceæ.	P——.	*Plumbaginaceæ.*
Primulaceæ.	Primulaceæ.	*Primulaceæ.*
Sapotaceæ.		
Ebenaceæ.		
Styracaceæ.		S——.
Oleaceæ.	O——.	*Oleaceæ.*
Apocynaceæ.	*Apocynaceæ.*	*Apocynaceæ.*
Asclepiadaceæ.	Asclepiadaceæ.	*Asclepiadaceæ.*
Loganiaceæ.		
Gentianaceæ.	Gentianaceæ.	Gentianaceæ.
Polemoniaceæ.	POLEMONIACEÆ.	POLEMONIACEÆ.
Hydrophyllaceæ.	HYDROPHYLLACEÆ.	HYDROPHYLLACEÆ.
Borraginaceæ.	Borraginaceæ.	Borraginaceæ.
Convolvulaceæ.	*Convolvulaceæ.*	*Convolvulaceæ.*
Solanaceæ.	*Solanaceæ.*	*Solanaceæ.*
Scrophulariaceæ.	SCROPHULARIACEÆ.	SCROPHULARIACEÆ.
Orobanchaceæ.	OROBANCHACEÆ.	Orobanchaceæ.
Lentibulaceæ.	L——.	L——.
Bignoniaceæ.	B——.	
Acanthaceæ.	A——.	A——.
Verbenaceæ.	*Verbenaceæ.*	*Verbenaceæ.*
Labiatæ.	*Labiatæ.*	Labiatæ.
Plantaginaceæ.	*Plantaginaceæ.*	*Plantaginaceæ.*
	Nyctaginaceæ.	Nyctaginaceæ.
Amarantaceæ.	Amarantaceæ.	*Amarantaceæ.*
Phytolaccaceæ.		
Polygonaceæ, proper.	POLYGONACEÆ.	POLYGONACEÆ.
E——.	ERIOGONEÆ.	ERIOGONEÆ.
Podostemaceæ.		
Aristolochiaceæ.		Aristolochiaceæ.
Saurureæ.		Saurureæ.
Lauraceæ.		*Lauraceæ.*
Thymelæaceæ.		*Thymelæaceæ.*
Elæagnaceæ.	Elæagnaceæ.	*Elæagnaceæ.*
Loranthaceæ.	*Loranthaceæ.*	Loranthaceæ.
SANTALACEÆ.	*Santalaceæ.*	*Santalaceæ.*
Euphorbiaceæ.	*Euphorbiaceæ.*	*Euphorbiaceæ.*
EMPETRACEÆ.		
Urticeæ.	U——.	*Urticeæ.*
Ulmaceæ.	U——.	
Cannabineæ.	*Cannabineæ.*	
Moreæ.		
Platanaceæ.		Platanaceæ.
LEITNERIEÆ.		
JUGLANDACEÆ.		*Juglandaceæ.*
CUPULIFERÆ.	C——.	Cupuliferæ.

Atlantic Flora.	Rocky Mountain Flora.	Pacific Flora.
Corylaceæ.	C——.	C——.
BETULACEÆ.	*Betulaceæ.*	Betulaceæ.
Myricaceæ.		*Myricaceæ.*
Salicineæ.	*Salicineæ.*	Salicineæ.
	Gnetaceæ.	*Gnetaceæ.*
Taxineæ.		Taxineæ.
Cupressineæ.	*Cupressineæ.*	CUPRESSINEÆ.
Taxodineæ.		Taxodineæ.
Abietineæ.	*Abietineæ.*	ABIETINEÆ.
Palmeæ.		*Palmeæ.*
Araceæ.		*Araceæ.*
Lemnaceæ.	L——.	Lemnaceæ.
Typhaceæ.	*Typhaceæ.*	Typhaceæ.
Alismaceæ.	A——.	Alismaceæ.
Hydrocharidaceæ.		H——.
Burmanniaceæ.		
Cannaceæ.		
Orchidaceæ.	*Orchidaceæ.*	Orchidaceæ.
Amaryllidaceæ.	A——.	A——.
Hæmodoraceæ.		
Bromeliaceæ.		
Iridaceæ.	*Iridaceæ.*	Iridaceæ.
Dioscoreaceæ.		
Roxburghiaceæ.		
Smilaceæ.	S——.	*Smilaceæ.*
Liliaceæ.	Liliaceæ.	LILIACEÆ.
Juncaceæ.	Juncaceæ.	Juncaceæ.
Pontederiaceæ.		P——.
Xyridaceæ.		
Eriocauloneæ.		
CYPERACEÆ.	*Cyperaceæ.*	Cyperaceæ.
Gramineæ.	Gramineæ.	Gramineæ.

The groups in this tabulation, it will be observed, have not all the rank of orders. Such as they are, the—

Atlantic flora has	156
Rocky Mountain flora (in most extensive sense)	112
Pacific flora	127

But of the groups very slightly represented there is only one in the first, while there are twenty-four in the Rocky Mountain flora and fifteen in the Pacific. If these be omitted the greater diversification of the Atlantic flora will be the more apparent—

Atlantic orders or groups	155
Rocky Mountain	88
Pacific	112

As to the numerical extent, respectively, of these three great divisions of the United States flora, exactness would be attainable only through much labor; and an approximation is nearly as valuable as would be a close count from present and still changing data. Mann's Catalogue of the Phænogamous Plants of the United States east of the Mississippi, may be taken for the Atlantic flora, excluding for our purpose the introduced species and those of the Florida peninsula. The official Botany of California, mainly by S. Watson, now just completed, includes or mentions the greater part of the Pacific species and genera, but includes many which, though indigenous to that State or near its borders, really pertain only to the flora of the interior basin. Mr. Watson's careful elaboration of the botany of this basin and its borders, presented in his volume (V.) of Clarence King's Explorations and Surveys on the Fortieth Parallel, sums up and analyzes the vegetation of this district; but for the proper Rocky Mountains and the eastern plains no such summary is at hand, although Porter and Coulter's Flora of Colorado has brought together some of the materials.

We may estimate that the Atlantic flora north of the thirtieth parallel (and wholly excluding Texas) consists of 850 Phænogamous genera and 3,400 species; that the Pacific flora as now known does not exceed 620 genera and 3,000 species. Mr. Watson ten years ago had knowledge of 1,235 species in 439 genera (and 84 orders) in the Great Basin and the adjacent Wahsatch and Uinta Mountains. If the ratio of genera and species to orders is the same as in the Atlantic States, the whole Rocky Mountain flora, from its eastern plains to the Sierra, and within the designated parallels of latitude, would contain about 480 genera and 1,930 species; and this is probably not far from the mark.

The botanist will see at a glance the principal contrasts between the Atlantic and Pacific floras. The Atlantic is the region of round-headed and deciduous-leaved trees; the Pacific of spire-shaped, evergreen, Coniferous trees; and the Rocky Mountain forest is of the same type as that of the Pacific, only on a diminished scale, and with the more striking forms left out.

The Atlantic flora has almost three times as many genera and four times as many species of non-Coniferous trees as the Pacific, but it has rather fewer genera and almost one-half fewer species of Coniferous trees than the Pacific.

The forest of the Atlantic States is, with one exception (that of Northeastern Asia), much the most diversified, *i. e.*, the richest in genera and orders, as well as species, of any other temperate region. That of the Pacific is one of the least diversified, except for its *Coniferæ*. Both together are remarkable for the persistence in them of certain peculiar archæological types of the latter, namely, *Taxodium* and *Torreya* on the Atlantic side, *Torreya*, *Libocedrus*, and, above all, *Sequoia*, on the Pacific.

The Atlantic forest is of no inferior grandeur; few parts of the northern hemisphere equal it in the stateliness of its trees, but the grandeur of the Pacific forest growth as to Coniferous trees is wholly unequaled.

These points have been brought out in a discourse by the present writer (entitled Forest Geography and Archæology), which was published in the American Journal of Science and Arts, ser. 3, xvi, 1878, and which, having been prepared in view of this report, it is proposed to append the more important portions of it.

There are certain orders or groups in which the diversification of types and the number of forms in the Pacific flora much surpasses that of the Atlantic, and it is to these that the salient features of the former are mainly to be attributed; and in referring to these, the western interior flora, sharing in these features, may be taken with the Pacific flora proper.

The largest of all the Phænogamous orders, the *Compositæ*, used to be reckoned as constituting a tenth part of the Phænogamous vegetation of the world and an eighth part of that of North America. It forms fully an eighth part of the Atlantic flora. It appears to form between a sixth and a seventh part of the species in the district west of the Rocky Mountains, and a still larger proportion of the genera. Here are found most of the *Helenioideæ* and almost all the *Madieæ*, and of the other tribes there is no lack, except of *Vernoniaceæ.*

The *Scrophulariaceæ* are far more conspicuous and preponderant on the western side of the continent, not so much, if at all, in genera, but vastly in the number of species. This is mainly owing to the wonderful development of certain genera (*Pentstemon*, *Mimulus*, *Castilleia*, *Orthocarpus*), as has been already stated.

The *Polemoniaceæ* form an even more marked feature, the western flora having more genera, indeed five times as many forms and five times as many species as the eastern.

The *Hydrophyllaceæ* are in nearly a similar case; the *Borraginaceæ* approach to it, and so do the *Chenopodiaceæ.*

The *Eriogoneæ*, however, claim the first rank; considering the number of the species and the distribution of the group, no other group of ordinal or subordinal rank is so completely characteristic of Western North American botany as this.

Finally, as to the *Liliaceæ* (in the extended sense), although the Atlantic flora is rich in them, yet the Pacific region considerably surpasses it in the number of genera, and largely surpasses it in the number of species and in the conspicuousness of the flowers.

III.

NORTH AMERICAN TYPES IN SOUTH AMERICA.

The botany of the southern part of the eastern great plain of the interior arid district, and of Southern California, merges in that of the Texano-Arizonian belt, and this into that of the Mexican plateau. It is probable that from these plateaux our western regions received the greater part of their present forms and types.

We may expect soon to know more than we now do of the botany of the cooler parts of Mexico, and to have this knowledge in a conveniently available form.

It appears, however, that the Texano-Arizonian species or their representatives do not prevail far down into Mexico, and that the arctic-alpine species and other northern types of the higher mountains are soon replaced southward by andine forms.

There are clear if not very numerous indications that there has at some former time been greater opportunity than now for the extension of North American species and types into the southern hemisphere. And it appears that this has taken place mainly along the western side of the American continent, on which the mountains abut on the coast—that is, as respects American plants which have found their way to extra-tropical South America. On the Atlantic side there appears to have been only a slight commingling of warm-temperate United States plants with the flora of the nearer tropical districts. Thus, the island of Cuba has *Pinus Elliottii* (*Cubensis*), *Illicium parviflorum*, some species of *Asimina*, all the *Nymphæaceæ* of the Atlantic flora, *Ascyrum amplexicaule*, &c., our *Ampelopsis* and *Vitis bipinnata*, *Ilex Dahoon*, a *Rhexia*, *Oldenlandia glomerata*, *Houstonia patens*, *Pterocaulon*, *Andromeda nitida*, *Cyrilla*, *Sabbatia gracilis*, *Mitreola petiolata*, *Lachnanthes tinctoria*, *Mayaca*, &c. These, the *Ampelopsis* excepted, are peculiar to the Atlantic coast. Cuba, moreover, has a species of *Kalmia!*

But more speculative interest arises from the consideration of the North American types, and in many cases the actual species, which reappear beyond the tropic in South America, on the western and not rarely on the eastern side of that continent. There are a number of plants indigenous to Chili, the presence of which in California—where they are seemingly no less indigenous—may be accounted for by the immigration of men and cattle. This may have been the case with *Senebiera*, *Pentacæna*, *Acæna trifida*, *Plectritis* (*Betkea*) *samolifolia*, *Bowlesia lobata*, *Amblyopappus pusillus*, *Pectocarya*, *Lastarriæa*, and the like. For *Erodium cicutarium*, *Medicago denticulata*, *Melilotus parviflora*, *Oligomeris subulata*, and *Avena fatua*, which are now equally at home in California, probably arrived by that route rather than direct from Europe. But we cannot in this way explain the presence in the two temperate zones of plants such as the following, which we assume to be North American species or types dispersed into South America. Some few of them might with equal likelihood be viewed as Chilian types with abnormal northern dispersion. We enumerate only such as come to view without particular search, and exclusive of those which may have been dispersed under man's unconscious agency. Identical species in italics:

Anemone decapetala.
Anemone multifida.
Myosurus aristatus.
Sisymbrium canescens.
Vesicaria, said to be *arctica.*
Malvastrum of North American type.
Sphæralcea of North American type.
Modiola multifida (Atlantic).
Sida (Pseudo-Malvastrum) sulphurea.
Elatine Americana.
Larrea.
Rhus § Lithræa.
Lupinus microcarpus.
Trifolium Macræi.
Trifolium microdon.
Hosackia subpinnata.
Lathyrus maritimus.
Hoffmanseggia.
Prosopis (*Algarobia*) *juliflora.*
Prosopis (Strombocarpa) sp. aff.
Fragaria Chilensis.
Lepuropetalon spathulatum (Atlantic and Chilian).
Gayophytum sp.
Œnothera sp. aff.
Œnothera dentata.
Œnothera cheiranthifolia.
Boisduvalia sp.
Godetia sp.
Mentzelia sp. aff.

Crantzia lineata.
Hydrocotyle ranunculoides, &c.
Osmorrhiza.
Galium § Relbunium.
Galium § Trichogalium.
Mikania scandens?
Gutierrezia.
Grindelia.
Aplopappus.
Nardophyllum (aff. Bigelovia).
Micropus.
Adenocaulon.
Polymnia.
Thelesperma scabiosoides!
Madia sativa.
Jaumea linearifolia.
Lasthenia obtusifolia.
Bahia.
Schkuhria.
Blennosperma Chilense.
Actinella sp.
Gaillardia (Cercostylis) (Bonaria).
Soliva (North American species immigrated?).
Centaurea (Plectocephalus) Chilensis.
Microseris pygmæa.
Downingia pusilla.
Specularia biflora.
Menodora sp.
Primula farinosa.
Microcala quadrangularis.
Erythræa Chilensis.
Collomia gracilis, &c.
Gilia pusilla.
Gilia (Navarretia) involucrata.
Gilia laciniata.
Phacelia circinata.
Phacelia (Microgenetes) Cumingii.
Coldenia § Tiquilia.
Eritrichium fulvum, &c.
Amsinckia angustifolia.
Solanum elæagnifolium.
Physalis viscosa.
Mimulus luteus.
Orthocarpus australis.
(Verbena § Glandularia, &c.)
Plantago Patagonica.
Plantago hirtella.
Plantago maritima (Eu. &c.).
Oxybaphus sp.
Allionia incarnata.
Spirostachys sp.
Oxytheca dendroidea.
Chorizanthe sp.
Lastarreia Chilensis (mentioned above).
Podostemon.
Lilæa subulata.
Scirpus riparius.
Scirpus tatora.
Hemicarpha subsquarrosa.
Gramineæ, several.

Here are near upon 90 species or genera, and almost half of them are identical with a few proximately related species. Most of them affect the Chilian side of the continent. One or two are known only on the eastern side. The most remarkable of these are the *Gaillardia* and the *Thelesperma*, of Buenos Ayres; the former closely related to an equally anomalous Texan species; the latter almost identical with a Texano-Nebraskan species. One of the *Strombocarpa* species of *Prosopis*, of the southern end of Texas, is hardly and perhaps not specifically distinguishable from one of Buenos Ayres. Of the 40 or more identical species, only 17 belong to the Atlantic flora; apparently only two of these are peculiar to it as respects North America, namely, the little *Lepuropetalon* of the Atlantic coast, not again met with this side of Chili, and the insignificant *Modiola multifida*. Quite possibly the latter was introduced into North America as a ballast weed.

The natural and obvious line of communication between the botany of the northern and southern temperate zones has been along the central part of North America and Mexico, and along the western part of South America. When our cool temperate flora flourished only along or near the southern borders of the United States, the warm-temperate (to which most of the above-enumerated forms belong) were still further south. When the climate became again warmer, a portion of these plants were as well placed for southward as for northward retreat.

IV.

NOTES ON THE SOURCES OF THE NORTH AMERICAN FLORA.

Before yielding the pen to his associate, who will develop the relations of the whole North American flora to those of other parts of the northern hemisphere, the present writer may sum up, without developing them, one or two of the probable or plausible inferences or theoretical deductions which the present state of our knowledge, gathered from a great variety of data, appear to enable us to draw. They are conclusions the acceptance of which affords at least a clue to the explanation of the condition, constitution, and seeming anomalies of the actual geographical distribution of the genera and species of our part of the world. The non-professional reader may best apprehend the ground of these deductions by a perusal of the discourse already referred to, which is appended to this report.

The present vegetation of the world is a continuation with successive modification of that of preceding geological times, and the plants indigenous to any country are completely adapted to its climate, and therefore are capable of enduring its extremes.

Accordingly the explanation of the present assignment of species and genera is to be sought partly in the geological past, partly in the actual climate. Questions of the latter kind are comparatively simple. There is no difficulty in understanding why our Atlantic region was naturally covered with forest, why the great plains toward the Rocky Mountains are woodless, and why plains with a saline soil are abandoned to a vegetation resembling that of sea-coasts. There is no insuperable difficulty in comprehending how high mountains may nourish forests, even when favored with little absolute rainfall. The difficulty is in ascertaining how a particular species of tree or other plant came to be a constituent of a certain flora, at stations widely separated from its nearest relatives, or even from other members of the same species. This is not a difficulty, but only a sterile wonder, to those who suppose that facts of this order have no scientific explanation, or none which they can hope to reach. It is one only to those who assume that all the members of a species, and even all the species of a natural genus, were derived at some time or other from a common stock; but this is the assumption now generally made in natural history. A reference to the existing state of things will seldom answer questions of this kind; but a reference to the past may sometimes do so.

Although the vegetable palæontologist goes farther back, the botanist of our era, in the discussion of his problems, may take the Tertiary period for his point of departure. At least, the key to the distribution of the flora of the temperate regions of the northern hemisphere—with which we are concerned—is afforded by the later Tertiary botany.

Our knowledge—fragmentary, yet real—of the flora around us begins with a period when it or its direct ancestors occupied the zone between the arctic circle and the pole, and doubtless several lower degrees of latitude. There it must have flourished until the coming on of that change of climate which culminated in the glacial period. It must at that time have encircled that portion of the earth much as the arctic flora now does. During the period of maximum refrigeration, its northern limits, abutting upon an arctic flora then in low latitude, must have been so far south in the Atlantic States that the vegetation of the northern shore of the Gulf of Mexico probably resembled that of the southern shore of the Gulf of Saint Lawrence now. Of this northern limit there cannot be much doubt; yet we could not hazard an opinion as to where the warm-temperate vegetation of that day merged into the subtropical, as it now does in Southern Texas.

The change between that period and the present, in the opposite direction, has been an amelioration of climate which has carried the arctic flora back to the arctic circle, with which we now associate it, excepting the portions which, in the retreat, have ascended the mountains and persisted there, forming the arctic-alpine vegetation. This, as we have seen, is very scanty in the Atlantic district, where it has abided only on the most northern mountains; while the more elevated ranges of the western part of the continent have afforded ampler refuge.

A similar advance and ensuing retrogression, consequent upon the coming and going out of the Glacial epoch, must have taken place in other parts of the northern hemisphere. Under these great and protracted movements of transference, we suppose that a common flora, which was comparatively homogeneous round the new arctic zone, has been differentiated into the several existing north-temperate floras, and that their common features, and the occasional very unexpected identities or similarities (such as those between Japanese and North American botany) are thus explained. Their respective peculiarities are thought to have resulted from the different vicissitudes and the different climatic conditions to which the primeval stock has been exposed in Asia, Europe, and America, and upon the opposite sides and great interiors of continents, the climates of which—greatly different now—have probably been so from very early times. The plants which were most adapted or adaptable to the one could not be expected to survive in another, or in any other than one of similar or analogous climate. But this is not the place for considering the application of these principles to the botany of the northern hemisphere generally. When they come to be applied to the theoretical elucidation of the great difference between the Atlantic and the Pacific floras it will need to be noted that the two sides of the continent, at the time when they received the progenitors of the present vegetation, were more completely separated than now; that they seem to have been, as it were, two long peninsulas stretching southward from a mainland at the north, the great plains between our eastern district and the Rocky Mountains being then under water.

It may be inferred that the Atlantic side of the continent was more open than the western to the reception of the ancestral flora from the north, and so received it in larger measure and variety, or that it has been since that time more free from disturbance and catastrophe. Probably the two causes may have conspired in the production of the result. There is, moreover, reason to suspect that the recession of the glaciation was earlier on the Atlantic side of the continent than in the more elevated central and Pacific regions; and that, from all these causes, its preglacial flora was more completely restored to it than to that of the Pacific side.

And, finally, we infer that the Pacific region, while preserving through all vicissitudes a moderate number of boreal types, and receiving a few Eastern Asiatic ones probably at a later date, has been mainly replenished from the Mexican plateau, and at a comparatively late period. A large part of the botany of California, still more of Nevada, Utah, and Western Texas, and, yet more, that of Arizona and New Mexico, may be regarded as a northward extension of the botany of the Mexican plateau.

This may, at least, be said: that two types have left their impress upon the North American flora, and that its peculiarities are divided between these two elements. One we may call the *boreal-oriental element;* this prevails at the north, and is especially well represented in the Atlantic flora and in that of Japan and Manchuria; the other is the *Mexican-plateau element*, and this gives its peculiar character to the flora of the whole southwestern part of North America, that of the higher mountains excepted.

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FOREST GEOGRAPHY AND ARCHÆOLOGY.

By Asa Gray.

[A lecture delivered before the Harvard University Natural History Society, April 18, 1878.]

* * * It is the forests of the northern temperate zone which we are to traverse. After taking some note of them in their present condition and relations, we may inquire into their pedigree; and, from a consideration of what and where the component trees have been in days of old, derive some probable explanation of peculiarities which otherwise seem inexplicable.

In speaking of our forests in their present condition, I mean not exactly as they are to-day, but as they were before civilized man had materially interfered with them.

In the district we inhabit such interference is so recent that we have little difficulty in conceiving the conditions which here prevailed, a few generations ago, when the "forest primeval"—described in the first lines of a familiar poem—covered essentially the whole country, from the Gulf of Saint Lawrence and Canada to Florida and Texas, from the Atlantic to beyond the Mississippi. This, our Atlantic forest, is one of the largest and almost the richest of the temperate forests of the world. That is, it comprises a greater diversity of species than any other, except one.

In crossing the country from the Atlantic westward, we leave this forest behind us when we pass the western borders of those organized States which lie along the right bank of the Mississippi. We exchange it for prairies and open plains, wooded only along the water-courses—plains which grow more and more bare and less green as we proceed westward, with only some scattering Cottonwoods (*i. e.* Poplars) on the immediate banks of the traversing rivers, which are themselves far between.

In the Rocky Mountains we come again to forest, but only in narrow lines or patches; and if you travel by the Pacific Railroad you hardly come to any; the eastern and the interior desert plains meet along the comparatively low level of the divide which here is so opportune for the railway; but both north and south of this line the mountains themselves are fairly wooded. Beyond, through all the wide interior basin, and also north and south of it, the numerous mountain chains seem to be as bare as the alkaline plains they traverse, mostly north and south, and the plains bear nothing taller than Sage-brush. But those who reach and climb these mountains find that their ravines and higher recesses nourish no small amount of timber, though the trees themselves are mostly small and always low.

When the western rim of this great basin is reached there is an abrupt change of scene. This rim is formed of the Sierra Nevada. Even its eastern slopes are forest-clad in great measure; while the western bear in some respects the noblest and most remarkable forest of the world—remarkable even for the number of species of evergreen trees occupying a comparatively narrow area, but especially for their wonderful development in size and altitude. Whatever may be claimed for individual Eucalyptus trees in certain sheltered ravines of the southern part of Australia, it is probable that there is no forest to be compared for grandeur with that which stretches, essentially unbroken, though often narrowed and nowhere very wide, from the southern part of the Sierra Nevada in latitude 36° to Puget Sound beyond latitude 49°, and not a little farther.

Descending into the long valley of California, the forest changes, dwindles, and mainly disappears. In the Pacific coast ranges it resumes its sway, with altered features, some of them not less magnificent and of greater beauty. The Redwoods of the coast, for instance, are little less gigantic than the Big-trees of the Sierra Nevada, and far handsomer, and a thousand times more numerous. And several species which are merely or mainly shrubs in the drier Sierra become lordly trees in the moister air of the northerly coast ranges. Through most of California these two Pacific forests are separate; in the northern part of that State they join and form one rich woodland belt, skirting the Pacific, backed by the Cascade Mountains, and extending through British Columbia into our Alaskan Territory.

So we have two forest regions in North America—an Atlantic and a Pacific. They may take these names, for they are dependent upon the oceans which they respectively border. Also we have an intermediate isolated region or isolated lines of forest, flanked on both sides by bare and arid plains—plains which on the eastern side may partly be called *prairies*—on the western, *deserts*.

This mid-region mountain forest is intersected by a transverse belt of arid and alkaline plateau, or eastward of grassy plain—a hundred miles wide from north to south—through which passes the Union Pacific Railroad. This divides the Rocky Mountain forest into a southern and a northern portion. The southern is completely isolated. The northern, in a cooler and less arid region, is larger, broader, more diffused. Trending westward, on and beyond the northern boundary of the United States, it approaches, and here and there unites with, the Pacific forest. Eastward, in northern British territory, it makes a narrow junction with northwestward prolongations of the broad Atlantic forest.

So much for these forests as a whole, their position, their limits. Before we glance at their distinguishing features and component trees, I should here answer the question, why they occupy the positions they do; why so curtailed and separated at the south, so much more diffused at the north, but still so strongly divided into eastern and western? Yet I must not consume time with the rudiments of physical geography and meteorology. It goes without saying that trees are nourished by moisture. They starve with dryness and they starve with cold. A tree is a sensitive thing. With its great spread of foliage, its vast amount of surface which it cannot diminish or change, except by losing that whereby it lives, it is completely and helplessly exposed to every atmospheric change; or at least its resources for adaptation are very limited, and it cannot flee for shelter. But trees are social, and their gregarious habits give a certain mutual support. A tree by itself is doomed, where a forest, once established, is comparatively secure.

Trees vary as widely as do other plants in their constitution; but none can withstand a certain amount of cold and other exposure, nor make head against a certain shortness of summer. Our high northern regions are therefore treeless, and so are the summits of high mountains in lower latitudes. As we ascend them we walk at first under Spruces and Fir-trees or Birches; at 6,000 feet on the White Mountains of New Hampshire, at 11,000 or 12,000 feet on the Colorado Rocky Mountains, we walk through or upon them; sometimes upon dwarfed and depressed individuals of the same species that made the canopy below. These depressed trees retain their hold on life only in virtue of being covered all winter by snow. At still higher altitude the species are wholly different, and for the most part these humble alpine plants of our temperate zone—which we cannot call trees, because they are only a foot or two or a span or two high—are the same as those of the arctic zone, of Northern Labrador, and of Greenland. The arctic and the alpine regions are equally unwooded from cold.

As the opposite extreme, under opposite conditions, look to equatorial America, on the Atlantic side, for the widest and most luxuriant forest-tract in the world, where winter is unknown, and a shower of rain falls almost every afternoon. The size of the Amazon and Orinoco—brimming throughout the year—testifies to the abundance of rain and its equable distribution.

The other side of the Andes, mostly farther south, shows the absolute contrast, in the want of rain and absence of forest; happily it is a narrow tract. The same is true of great tracts either side of the equatorial regions, the only district where great deserts reach the ocean.

It is also true of great continental interiors out of the equatorial belt, except where cloud-compelling mountain-chains coerce a certain deposition of moisture from air which could give none to the heated plains below. So the broad interior of our country is forestless from dryness in our latitude, as the high northern zone is forestless from cold.

Regions with distributed rain are naturally forest-clad. Regions with scanty rain, and at one season, are forestless or sparsely wooded, except they have some favoring compensations. Rainless regions are desert.

The Atlantic United States in the zone of variable weather and distributed rains, and with the Gulf of Mexico as a caldron for brewing rain, and no continental expanse between that great caldron and the Pacific, crossed by a prevalent southwest wind in summer, is greatly favored for summer as well as winter rain.

And so this forest region of ours, with annual rainfall of 50 inches on the Lower Mississippi, 52 inches in all the country east of it bordering the Gulf of Mexico, 45 to 41 in all the proper Atlantic district from East Florida to Maine, and the whole region drained by the Ohio—diminished only to 34 inches on the whole Upper Mississippi and Great Lake region—with this amount of rain, fairly distributed over the year, and the greater part not in the winter, our forest is well accounted for.

The narrow district occupied by the Pacific forest has a much more unequal rainfall, more unequal in its different parts, most unequal in the different seasons of the year, very different in the same place in different years.

From the Gulf of Mexico to the Gulf of St. Lawrence the amount of rain decreases moderately and rather regularly from south to north; but, as less is needed in a cold climate, there is enough to nourish forest throughout. On the Pacific coast, from the Gulf of California to Puget Sound, the southerly third has almost no rain at all; the middle portion less than our Atlantic least; the northern third has about our Atlantic average.

Then, New England has about the same amount of rainfall in winter and in summer; Florida and Alabama about one-half more in the three summer than in the three winter months—a fairly equable distribution. But on the Pacific coast there is no summer rain at all, except in the northern portion, and there little. And the winter rain, of forty-four inches on the northern border, diminishes to less than one-half before reaching the Bay of San Francisco; dwindles to twelve, ten, and eight inches on the southern coast, and to four inches before we reach the United States boundary below San Diego.

Taking the whole year together, and confining ourselves to the coast, the average rainfall for the year, from Puget Sound to the border of California, is from eighty inches at the north to seventy at the south, *i. e.*, seventy on the northern edge of California; thence it diminishes rapidly to thirty-six, twenty (about San Francisco), twelve, and at San Diego to eight inches.

The two rainiest regions of the United States are the Pacific coast north of latitude forty-five, and the northeastern coast and borders of the Gulf of Mexico. But when one is rainy the other is comparatively rainless. For while this Pacific rainy region has only from twelve to two inches of its rain in the summer months, Florida, out of its forty to sixty, has twenty to twenty-six in summer, and only six to ten of it in the winter months.

Again, the diminution of rainfall as we proceed inland from the Atlantic and Gulf shores, is gradual; the expanse that is or was forest-clad is very broad, and we wonder only that it did not extend farther west than it does.

On the other side of the continent, at the north, the district so favored with winter rain is but a narrow strip, between the ocean and the Cascade mountains. East of the latter the amount abruptly declines—for the year from eighty inches to sixteen; for the winter months, from forty-four and forty to eight and four inches; for the summer months, from twelve and four to two and one.

So we can understand why the Cascade Mountains abruptly separate dense and tall forest on the west from treelessness on the east. We may conjecture, also, why this North Pacific forest is so magnificent in its development.

Equally, in the rapid decrease of rainfall southward, in its corresponding restriction to one season, in the continuation of the Cascade mountains as the Sierra Nevada, cutting off access of rain to the interior, in the unbroken stretch of coast ranges near the sea, and the consequent small and precarious rainfall in the great interior valley of California, we see reasons why the Californian forest is mainly attenuated southward into two lines—into two files of a narrow but lordly procession, advancing southward along the coast ranges, and along the western flank of the Sierra Nevada, leaving the long valley between comparatively bare of trees.

By the limited and precarious rainfall of California, we may account for the limitations of its forest. But how shall we account for the fact that this district of comparatively little rain produces the largest trees in the world? Not only produces, alone of all the world, those two peculiar *Big-trees* which excite our special wonder—their extraordinary growth might be some idiosyncracy of a race—but also produces Pines and Fir-trees, whose brethren we know, and whose capabilities we can estimate upon a scale only less gigantic. Evidently there is something here wonderfully favorable to the development of trees, especially of coniferous trees; and it is not easy to determine what it can be.

Nor, indeed, does the rainfall of the coast of Oregon, great as it is, fully account for the extraordinary development of its forest; for the rain is nearly all in the winter, very little in the summer. Yet here is more timber to the acre than in any other part of North America, or perhaps in any other part of the world. The trees are never so enormous in girth as some of the Californian, but are of equal height—at least on the average—three hundred feet being common, and they stand almost within arms' length of each other.

The explanation of all this may mainly be found in the great climatic differences between the Pacific and the Atlantic sides of the continent; and the explanation of these differences is found in the difference in the winds and the great ocean currents.

The winds are from the ocean to the land all the year round, from northwesterly in summer, southwesterly in winter. And the great Pacific Gulf Stream sweeps toward and along the coast, instead of bearing away from it, as on our Atlantic side.

The winters are mild and short, and are to a great extent a season of growth, instead of suspension of growth as with us. So there is a far longer season available to tree-vegetation than with us, during all of which trees may either grow or accumulate the materials for growth. On our side of the continent and in this latitude, trees use the whole autumn in getting ready for a six-months winter, which is completely lost time.

Finally, as concerns the west coast, the lack of summer rain is made up by the moisture-laden ocean winds, which regularly every summer afternoon wrap the coast ranges of mountains, which these forests affect, with mist and fog. The Redwood, one of the two California Big-trees—the handsomest and far the most abundant and useful—is restricted to these coast-ranges, bathed with soft showers fresh from the ocean all winter, and with fogs and moist ocean air all summer. It is nowhere found beyond the reach of these fogs. South of Monterey, where this summer condensation lessens, and winter rains become precarious, the Redwoods disappear, and the general forest becomes restricted to favorable stations on mountain sides and summits. * * * The whole coast is bordered by a line of mountains, which condense the moisture of the sea-breezes upon their cool slopes and, summits. These winds, continuing eastward, descend dry into the valleys, and, warming as they descend, take up moisture instead of dropping any. These valleys, when broad, are sparsely wooded or woodless, except at the north, where summer rain is not very rare.

Beyond stretches the Sierra Nevada, all rainless in summer, except local hail-storms and snowfalls on its higher crests and peaks. Yet its flanks are forest-clad; and, between the levels of 3,000 and 9,000 feet, they bear an ample growth of the largest Coniferous trees known. In favored spots of this forest—and only there—are found those groves of the giant *Sequoia*, near kin of the Redwood of the coast-ranges, whose trunks are from fifty to ninety feet in circumference, and height from two hundred to three hundred and twenty-five feet. And in reaching these wondrous trees you ride through miles of Sugar Pines, Yellow Pines, Spruces, and Firs, of such magnificence in girth and height, that the Big-trees, when reached—astonishing as they are—seem not out of keeping with their surroundings.

I cannot pretend to account for the extreme magnificence of this Sierra Forest. Its rainfall is in winter, and of unknown but large amount. Doubtless most of it is in snow, of which fifty or sixty feet falls in some winters; and—different from the coast and in Oregon, where it falls as rain, and at a temperature which does not suspend vegetable action—here the winter must be complete cessation. But with such great snowfall the supply of moisture to the soil should be abundant and lasting.

Then the Sierra—much loftier than the coast-ranges—rising from 7,000 or 8,000 to 11,000 and 14,000 feet, is refreshed in summer by the winds from the Pacific, from which it takes the last drops of available moisture; and mountains of such altitude, to which moisture from whatever source or direction must necessarily be attracted, are always expected to support forests, at least when not cut off from sea winds by interposed chains of equal altitude. Trees such mountains will have. The only and the real wonder is that the Sierra Nevada should rear such immense trees!

Moreover, we shall see that this forest is rich and superb only in one line; that, beyond one favorite tribe, it is meagre enough. Such for situation, and extent, and surrounding conditions, are the two forests—the Atlantic and Pacific—which are to be compared.

In order to come to this comparison I must refrain from all account of the intervening forest of the Rocky Mountains, only saying, that it is comparatively poor in the size of its trees and the number of species; that few of its species are peculiar, and those mostly in the southern part, and of the Mexican plateau type; that they are common to the mountain-chains which lie between, stretched north and south *en echelon*, all through that arid or desert region of Utah and Nevada, of which the larger part belongs to the Great Basin between the Rocky Mountains and the Sierra Nevada; that most of the Rocky Mountain trees are identical in species with those of the *Pacific* forest, except far north, where a few of our eastern ones are intermingled. I may add that the Rocky Mountains proper get from twelve to twenty inches of rain in the year, mostly in winter snow, some in summer showers.

But the interior mountains get little, and the plains or valleys between them less; the Sierra arresting nearly all the moisture coming from the Pacific, the Rocky Mountains all coming from the Atlantic side.

Forests being my subject, I must not tarry on the woodless plain—on an average 500 miles wide—which lies between what forest there is in the Rocky Mountains and the western border of our eastern wooded region. Why this great sloping plain should be woodless—except where some Cottonwoods and their like mark the course of the traversing rivers—is, on the whole evident enough. Great interior plains in temperate latitudes are always woodless, even when not very arid. This of ours is not arid to the degree that the corresponding regions west of the Rocky Mountains are. The moisture from the Pacific which those would otherwise share, is, as we have seen, arrested on or near the western border, by the coast-ranges and again by the Sierra Nevada; and so the interior (except for the mountains) is all but desert.

On the eastern side of the continent the moisture supplied by the Atlantic and the Gulf of Mexico meets no such obstruction. So the diminution of rainfall is gradual instead of abrupt. But this moisture is spread over a vast surface, and it is naturally bestowed, first and most on the seaboard district, and least on the remote interior. From the Lower Mississippi eastward and northward, including the Ohio River basin, and so to the coast, and up to Nova Scotia, there is an average of forty-seven inches of rain in the year. This diminishes rather steadily westward, especially northwestward, and the western border of the ultra-Mississippian plains gets less than twenty inches.

Indeed, from the great prevalence of westerly and southerly winds, what precipitation of moisture there is on our western plains is not from Atlantic sources, nor much from the Gulf. The rain-chart plainly shows that the water raised from the heated Gulf is mainly carried northward and eastward. It is this which has given us the Atlantic forest region; and it is the limitation of this which bounds that forest at the west. The line on the rain-chart indicating twenty-four inches of annual rain is not far from the line of the western limit of trees, except far north, beyond the Great Lakes, where in the coolness of high latitudes, as in the coolness of mountains, a less amount of rainfall suffices for forest growth.

We see, then, why our great plains grow bare as we proceed from the Mississippi westward; though we wonder why this should take place so soon and so abruptly as it does. But, as already stated, the general course of the wind-bearing rains from the Gulf and beyond is such as to water well the Mississippi Valley and all eastward, but not the district west of it.

It does not altogether follow that, because rain or its equivalent is needed for forest, therefore wherever there is rain enough, forest must needs cover the ground. At least there are some curious exceptions to such a general rule—exceptions both ways. In the Sierra Nevada we are confronted with a stately forest along with a scanty rainfall, with rain only in the three winter months. All summer long, under those lofty trees, if you stir up the soil you may be choked with dust. On the other hand, the prairies of Iowa and Illinois, which form deep bays or great islands in our own forest-region, are spread under skies which drop more rain than probably ever falls on the slopes of the Sierra Nevada, and give it at all seasons. Under the lesser and brief rains we have the loftiest trees we know; under the more copious and well-dispersed rain, we have prairies, without forests at all.

There is little more to say about the first part of this paradox, and I have not much to say about the other. The cause or origin of our prairies—of the unwooded districts this side of the Mississippi and Missouri—has been much discussed, and a whole hour would be needed to give a fair account of the different views taken upon this knotty question. The only settled thing about it is that the prairies are not directly owing to a deficiency of rain. That the rain-charts settle, as Professor Whitney well insists.

The prairies which indent or are inclosed in our Atlantic forest-region, and the plains beyond this region, are different things. But, as the one borders—and in Iowa and Nebraska passes into—the other, it may be supposed that common causes have influenced both together, perhaps more than Professor Whitney allows.

He thinks that the extreme fineness and depth of the usual prairie soil will account for the absence of trees; and Mr. Lesquereux equally explains it by the nature of the soil, in a different way. These, and other excellent observers, scout the idea that immemorial burnings, in autumn and spring, have had any effect. Professor Shaler, from his observations in the border land of Kentucky, thinks that they have—that there are indications there of comparatively recent conversion of oak-openings into prairie, and now—since the burnings are over—of the reconversion of prairie into woodland.

I am disposed, on general considerations, to think that the line of demarcation between our woods and our plains is not where it was drawn by nature. Here, when no physical barrier is interposed between the ground that receives rain enough for forests, and that which receives too little, there must be a debatable border, where comparatively slight causes will turn the scale either way. Difference in soil and difference in exposure will here tell decisively. And along this border, annual burnings—for the purpose of increasing and improving buffalo feed—practiced for hundreds of years by our nomade predecessors, may have had a very marked effect. I suspect that the irregular border line may have in this way been rendered more irregular, and have been carried farther eastward wherever nature of soil or circumstances of exposure predisposed to it.

It does not follow that trees would re-occupy the land when the operation that destroyed them, or kept them down, ceased. The established turf or other occupation of the soil, and the sweeping winds, might prevent that. The difficulty of reforesting bleak New England coasts, which were originally well wooded, is well known. It is equally but probably not more difficult to establish forest on an Iowa prairie, with proper selection of trees.

The difference in the composition of the Atlantic and Pacific forests is not less marked than that of the climate and geographical configuration to which the two are respectively adapted.

With some very notable exceptions the forests of the whole northern hemisphere in the temperate zone (those that we are concerned with) are mainly made up of the same or similar kinds. Not of the same species; for rarely do identical trees occur in any two or more widely separated regions. But all round the world in our zone the woods contain Pines and Firs and Larches, Cypresses and Junipers, Oaks and Birches, Willows and Poplars, Maples and Ashes, and the like. Yet with all these family likenesses throughout, each region has some peculiar features—some trees by which the country may at once be distinguished.

Beginning by a comparison of our Pacific with our Atlantic forest, I need not take the time to enumerate the trees of the latter, as we all may be supposed to know them, and many of the genera will have to be mentioned in drawing the contrast to which I invite your attention. In this you will be impressed most of all, I think, with the fact that the greater part of our familiar trees are "conspicuous by their absence" from the Pacific forest.

For example, it has no Magnolias, no Tulip-tree, no Papaw, no Linden or Basswood, and is very poor in Maples; no Locust-trees—neither Flowering Locust nor Honey Locust—nor any leguminous tree; no Cherry large enough for a timber-tree, like our wild Black Cherry; no Gum-trees (Nyssa nor Liquidambar), nor Sorrel-tree, nor Kalmia; no Persimmon or Bumelia; not a Holly; only one Ash that may be called a timber-tree; no Catalpa or Sassafras; not a single Elm nor Hackberry; not a Mulberry, nor Planer-tree, nor Maclura; not a Hickory, nor a Beech, nor a true Chestnut, nor a Hornbeam; barely one Birch-tree, and that only far north, where the differences are less striking. But as to coniferous trees, the only missing type is our Bald Cypress, the so-called Cypress of our southern swamps, and that deficiency is made up by other things. But as to ordinary trees, if you ask what takes the place in Oregon and California of all these missing kinds, which are familiar on our side of the continent, I must answer, nothing, or nearly nothing. There is the *Madroña* (Arbutus) instead of our Kalmia (both really trees in some places); and there is the California laurel instead of our southern Red Bay tree. Nor in any of the genera common to the two does the Pacific forest equal the Atlantic in species. It has not half as many Maples nor Ashes nor Poplars nor Walnuts nor Birches, and those it has are of smaller size and inferior quality; it has not half as many Oaks; and these and the Ashes are of so inferior economical value that (as we are told) a passable wagon-wheel cannot be made of California wood, nor a really good one in Oregon.

This poverty of the western forest in species and types may be exhibited graphically, in a way which cannot fail to strike the eye more impressively than when we say that, whereas the Atlantic forest is composed of 66 genera and 155 species, the Pacific forest has only 31 genera and 78 species. * In the appended diagrams the short side of the rectangle is proportional to the number of genera, the long side to the number of species.

Now the geographical areas of the two forests are not very different. From the Gulf of Mexico to the Gulf of Saint Lawrence about twenty degrees of latitude intervene. From the southern end of California to the peninsula of Alaska there are twenty-eight degrees, and the forest on the coast runs some degrees north of this; the length may therefore make up for the comparative narrowness of the Pacific forest region. How can so meagre a forest make so imposing a show? Surely not by the greater number and size of its individuals, so far as deciduous (or more correctly non-coniferous) trees are concerned; for on the whole they are inferior to their eastern brethren in size if not in number of individuals. The reason is that a larger proportion of the genera and species are coniferous trees; and these being evergreen (except the Larches), of aspiring port and eminently gregarious habit, usually dominate where they occur. While the East has almost three times as many genera and four times as many species of non-coniferous trees as the West, it has slightly fewer genera and almost one-half fewer species of coniferous trees than the West; that is, the Atlantic coniferous forest is represented by 11 genera and 25 species; the Pacific by 12 genera and 44 species. This relative preponderance may also be expressed by the diagrams, in which the smaller inclosed rectangles, drawn on the same scale, represent the coniferous portions of these forests.

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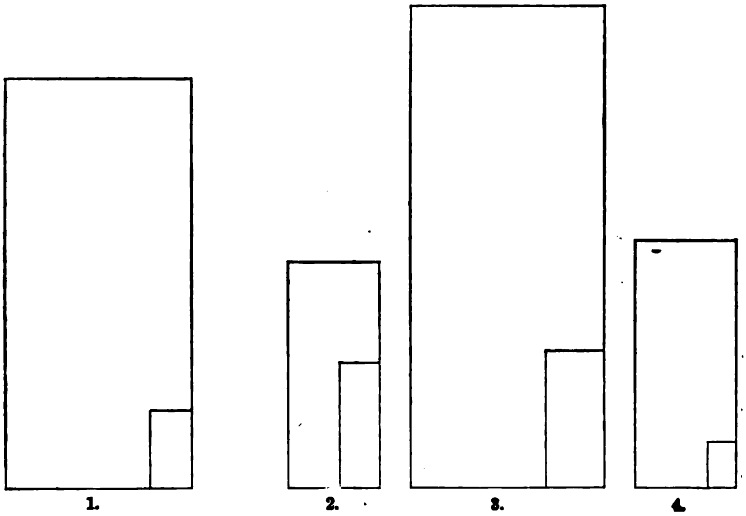
* We take in only timber trees, or such as attain in the most favorable localities to a size which gives them a clear title to the arboreous rank. The subtropical southern extremity and keys of Florida are excluded. So also are one or two trees of the Arizonian region, which may touch the evanescent southern borders of the Californian forest. In counting the coniferous genera, Pinus, Larix, Picea, Abies, and Tsuga are admitted to this rank, but Cupressus and Chamæcyparis are taken as one genus.

Indeed, the Pacific forest is made up of conifers, with non-coniferous trees as occasional undergrowth or as scattered individuals, and conspicuous only in valleys or in the sparse tree-growth of plains, on which the oaks at most reproduce the features of the "oak openings" here and there bordering the Mississippi prairie region. Perhaps the most striking contrast between the West and the East, along the latitude usually traversed, is that between the spiry evergreens which the traveller leaves when he quits California, and the familiar woods of various-hued round-headed trees which give him the feeling of home when he reaches the Mississippi. The Atlantic forest is particularly rich in these, and is not meagre in coniferous trees. All the glory of the Pacific forest is in its coniferous trees. Its desperate poverty in other trees appears in the annexed diagram.



1. Atlantic American forest.
2. Pacific American forest.
3. Japan-Manchurian forest.
4. European forest.

These diagrams are made more instructive, and the relative richness of the forests round the world in our latitude is most simply exhibited, by adding two or three similar ones. Two will serve, one for Europe, the other for Northeast Asia. A third would be the Himalay-Altaian region, geographically intermediate between the other two as the Arizona-Rocky Mountain district is between our eastern and western. Both are here left out of view, partly for the same, partly for special reasons pertaining to each, which I must not stop to explain. These four marked specimens will simply and clearly exhibit the general facts.

Keeping as nearly as possible to the same scale, we may count the indigenous forest trees of all Europe at 33 genera and 85 species, and those of the Japan-Manchurian region, of very much smaller geographical area, at 66 genera and 168 species. I here include in it only Japan, Eastern Manchuria, and the adjacent borders of China. The known species of trees must be rather roughly determined, but the numbers here given are not exaggerated, and are much more likely to be sensibly increased by further knowledge than are those of any of the other species. Properly to estimate the surpassing richness of this Japan-Manchurian forest, the comparative smallness of geographical area must come in as an important consideration.

To complete the view, let it be noted that the division of these forests into coniferous and non-coniferous is, for the—

	Genera.	Species.
European non-coniferous	26	68
European coniferous	7	17
	33	85
Japan-Manchurian non-coniferous	47	123
Japan-Manchurian coniferous	19	45
	66	168

In other words, a narrow region in Eastern Asia contains twice as many genera and about twice as many species of indigenous trees as are possessed by all Europe; and as to coniferous trees, the former has more genera than the latter has species, and over twice and a half as many species.

The only question about the relation of these four forest regions, as to their component species, which we can here pause to answer, is to what extent they contain trees of identical species. If we took the shrubs, there would be a small number, if the herbs, a very considerable number, of species common to the two New World and to the two Old World areas, respectively, at least to their northern portions, even after excluding arctic-alpine plants. The same may be said, in its degree, of the North European flora compared with the Atlantic North American, of the Northeast Asiatic compared with the northern part of the Pacific North American, and also in a peculiar way (which I have formerly pointed out, and shall have soon to mention) of the Northeastern Asiatic flora in its relations to the Atlantic North American. But as to the forest trees there is very little community of species. Yet this is not absolutely wanting. The Red Cedar (*Juniperus Virginiana*) among coniferous trees, and *Populus tremuloides* among the deciduous, extend across the American continent specifically unchanged, though hardly developed as forest trees on the Pacific side. There are probably, but not certainly, one or two instances on the northern verge of these two forests. There are as many in which eastern and western species are suggestively similar. The Hemlock-Spruce of the Northern Atlantic States and the Yew of Florida are extremely like corresponding trees of the Pacific forest. Indeed, the Yew-trees of all four regions may come to be regarded as forms of one polymorphous species. The White Birch of Europe and that of Canada and New England are in similar case, and so is the common Chestnut (in America confined to the Atlantic States), which, on the other side of the world, is also represented in Japan. A link in the other direction is seen in one Spruce-tree (called in Oregon Menzies Spruce) which inhabits Northeast Asia, while a peculiar form of it represents the species of the Rocky Mountains.

But now other and more theoretical questions come to be asked, such as these:

Why should our Pacific forest region, which is rich and in some respects unique in coniferous, be so poor in deciduous trees?

Then the two *Big-trees*, Sequoias, as isolated in character as in location—being found only in California, and having no near relatives anywhere—how came California to have them?

Such relatives as the Sequoias have are also local, peculiar, and chiefly of one species to each genus. Only one of them is American, and that solely eastern, the Taxodium of our Atlantic States and the plateau of Mexico. The others are Japanese and Chinese.

Why should trees of six related genera, which will all thrive in Europe, be restricted naturally, one to the eastern side of the American continent, one genus to the western side and very locally, the rest to a small portion of the eastern border of Asia?

Why should coniferous trees most affect and preserve the greatest number of types in these parts of the world?

And why should the Northeast Asian region have, in a comparatively small area, not only most coniferous trees, but a notably larger number of trees altogether than any other part of the northern temperate zone? Why should its only and near rival be in the antipodes, namely, here in Atlantic North America? In other words, why should the Pacific and the European forests be so poor in comparison, and why the Pacific poorest of all in deciduous yet rich in coniferous trees?

The first step toward an explanation of the superior richness in trees of these antipodal regions, is to note some striking similarities of the two, and especially the number of peculiar types which they divide between them. The ultimate conclusion may at length be ventured, that this richness is normal, and that what we really have to explain is the absence of so many forms from Europe on the one hand, from Oregon and California on the other. Let me recall to mind the list of kinds (*i. e.* genera) of trees which enrich our Atlantic forest but are wanting to that of the Pacific. Now almost all these recur, in more or less similar but not identical species, in Japan, North China, &c. Some of them are likewise European, but more are not so. Extending the comparison to shrubs and herbs, it more and more appears that the forms and types which we count as peculiar to our Atlantic region, when we compare them, as we first naturally do, with Europe and with our West, have their close counterparts in Japan and North China; some in identical species (especially among the herbs), often in strikingly similar ones, not rarely as sole species of peculiar genera or in related generic types. I was a very young botanist when I began to notice this; and I have from time to time made lists of such instances. Evidences of this remarkable relationship have multiplied year after year, until what was long a wonder has come to be so common that I should now not be greatly surprised if a Sarracenia or a Dionæa, or their like, should turn up in Eastern Asia. Very few of such isolated types remain without counterparts. It is as if Nature, when she had enough species of a genus to go round, dealt them fairly, one at least to each quarter of our zone; but when she had only two of some peculiar kind gave one to us and the other to Japan, Manchuria, or the Himalayas; when she had only one, divided these between the two partners on the opposite side of the table. The result, as to the trees, is seen in these four diagrams. As to number of species generally, it cannot be said that Europe and Pacific North America are at all in arrears. But as to trees, either the contrasted regions have been exceptionally favored, or these have been hardly dealt with. There is, as I have intimated, some reason to adopt the latter alternative.

We may take it for granted that the indigenous plants of any country, particularly the trees, have been selected by climate. Whatever other influences or circumstances have been brought to bear upon them, or the trees have brought to bear on each other, no tree could hold its place as a member of any forest or flora which is not adapted to endure even the extremes of the climate of the region or station. But the character of the climate will not explain the remarkable paucity of the trees which compose the indigenous European forest. That is proved by experiment, sufficiently prolonged in certain cases to justify the inference. Probably there is no tree of the northern temperate zone which will not flourish in some part of Europe. Great Britain alone can grow double or treble the number of trees that the Atlantic States can. In all the latter we can grow hardly one tree of the Pacific coast. England supports all of them, and all our Atlantic trees also, and likewise the Japanese and North Siberian species, which do thrive here remarkably in some part of the Atlantic coast, especially the cooler-temperate ones. The poverty of the European sylva is attributable to the absence of our Atlantic American types, to its having no Magnolia, Liriodendron, Asimina, Negundo, no Æsculus, none of that rich assemblage of leguminous trees represented by Locusts, Honey-Locusts, Gymnocladus, and Cladrastis (even its Cercis, which is hardly European, is like the Californian one mainly a shrub); no Nyssa, nor Liquidambar; no Ericaceæ rising to a tree; no Bumelia, Catalpa, Sassafras, Osage Orange, Hickory, or Walnut; and as to conifers, no Hemlock Spruce, Arbor-vitæ, Taxodium, nor Torreya. As compared with Northeastern Asia, Europe wants most of these same types, also the Ailantus, Gingko, and a goodly number of coniferous genera. I cannot point to any types tending to make up the deficiency; that is, to any not either in East North America or in Northeast Asia, or in both. Cedrus, the true Cedar, which comes near to it, is only North African and Asian. I need not say that Europe has no Sequoia, and shares no special type with California.

Now the capital fact is that many and perhaps almost all of these genera of trees were well represented in Europe throughout the later Tertiary times. It had not only the same generic types, but in some cases even the same species, or what must pass as such, in the lack of recognizable distinctions between fossil remains and living analogues. Probably the European Miocene forest was about as rich and various as is ours of the present day, and very like it. The Glacial period came and passed, and these types have not survived there, nor returned. Hence the comparative poverty of the existing European sylva, or, at least, the probable explanation of the absence of those kinds of trees which make the characteristic difference.

Why did these trees perish out of Europe, but survive in America and Asia? Before we inquire how Europe lost them, it may be well to ask how it got them. How came these American trees to be in Europe? And among the rest, how came Europe to have Sequoias, now represented only by our two Big-trees of California? It actually possessed two species and more—one so closely answering to the Redwood of the coast ranges, and another so very like the *Sequoia gigantea* of the Sierra Nevada, that, if such fossil twigs with leaves and cones had been exhumed in California instead of Europe, it would confidently be affirmed that we had resurrected the veritable ancestors of our two giant trees. Indeed, so it may probably be. "*Cœlum non animam mutant*," &c., may be applicable even to such wide wanderings and such vast intervals of time. If the specific essence has not changed, and even if it has suffered some change, genealogical connection is to be inferred in all such cases.

That is, in these days it is taken for granted that individuals of the same species, or with a certain likeness throughout, had a single birthplace and are descended from the same stock, no matter how widely separated they may have been either in space or time, or both. The contrary supposition may be made, and was seriously entertained by some not very long ago. It is even supposable that plants and animals originated where they now are, or where their remains were found. But this is not science—in other words, it is not conformable to what we now know, and is an assertion that scientific explanation is not to be sought.

Furthermore, when species of the same genus are not found almost everywhere, they are usually grouped in one region, as are the Hickories in the Atlantic States, the Asters and Goldenrods in North America and prevailingly on the Atlantic side, the heaths in Western Europe and Africa. From this we are led to the inference that all species closely related to each other have had a common birthplace and origin. So that, when we find individuals of a species or of a group widely out of the range of their fellows we wonder how they got there. When we find the same species all round the hemisphere, we ask how this dispersion came to pass.

Now, a very considerable number of species of herbs and shrubs and a few trees of the temperate zone are found all round the northern hemisphere; many others are found part way round—some in Europe and Eastern Asia, some in Europe and our Atlantic States, many, as I have said, in the Atlantic States and Eastern Asia—fewer (which is curious) common to Pacific States and Eastern Asia, nearer though these countries be.

We may set it down as useless to try to account for this distribution by causes now in operation and opportunities now afforded, *i. e.*, for distribution across oceans by winds and currents and birds. These means play their part in dispersion from place to place, by step after step, but not from continent to continent, except for few things and in a subordinate way.

Fortunately we are not obliged to have recourse to overstrained suppositions of what might possibly have occurred now and then, in the lapse of time, by the chance conveyance of seeds across oceans, or even from one mountain to another. The plants of the top of the White Mountains and of Labrador are mainly the same; but we need not suppose that it is so because birds have carried seeds from the one to the other.

I take it that the true explanation of the whole problem comes from a just general view, and not through piecemeal suppositions of chances. And I am clear that it is to be found by looking to the north, to the state of things at the arctic zone—first, as it now is, and then as it has been.

North of our forest regions comes the zone unwooded from cold—the zone of arctic vegetation. In this, as a rule, the species are the same round the world; as exceptions, some are restricted to a part of the circle.

The polar projection of the earth down to the northern tropic, as here exhibited, shows to the eye—as our maps do not—how all the lands come together into one region, and how natural it may be for the same species, under homogeneous conditions, to spread over it. When we know, moreover, that sea and land have varied greatly since these species existed, we may well believe that any ocean-gaps now in the way of equable distribution may have been bridged over. There is now only one considerable gap.

What would happen if a cold period were to come on from the north, and were very slowly to carry the present arctic climate, or something like it, down far into the temperate zone? Why, just what has happened in the Glacial period, when the refrigeration somehow pushed all these plants before it down to Southern Europe, to Middle Asia, to the middle and southern part of the United States, and, at length receding, left some parts of them stranded on the Pyrenees, the Alps, the Appenines, the Caucasus, on our White and Rocky Mountains, or wherever they could escape the increasing warmth as well by ascending mountains as by receding northward at lower levels. Those that kept together at a low level and made good their retreat form the main body of present arctic vegetation. Those that took to the mountains had their line of retreat cut off, and hold their positions on mountain tops under cover of the frigid climate due to elevation. The conditions of these on different continents or different mountains are similar, but not wholly alike. Some species proved better adapted to one, some to another part of the world. Where less adapted or less adaptable, they have perished; where better adapted they continue, with or without some change, and hence the diversification of alpine plants, as well as the general likeness through all the northern hemisphere.

All this exactly applies to the temperate zone vegetation and to the trees that we are concerned with. The clew was seized when the fossil botany of the high arctic regions came to light; when it was demonstrated that in the times next preceding the Glacial period—in the latest Tertiary—from Spitzbergen and Iceland to Greenland and Kamtschatka a climate like that we now enjoy prevailed, and forests like those of New England and Virginia and of California clothed the land. We infer the climate from the trees, and the trees give sure indications of the climate.

I had divined and published the explanation long before I knew of the fossil plants. These, since made known, render the inference sure, and give us a clear idea of just what the climate was. At the time we speak of, Greenland, Spitzbergen, and our arctic Sea shore had the climate of Pennsylvania and Virginia now. It would take too much time to enumerate the sorts of trees that have been identified by their leaves and fruits in the arctic later Tertiary deposits.

I can only say at large that the same species have been found all round the world; that the richest and most extensive finds are in Greenland; that they comprise most of the sorts which I have spoken of as American trees which once lived in Europe—Magnolias, Sassafras, Hickories, Gum-trees, our identical Southern Cypress (for all we can see of difference), and especially *Sequoias*, not only the two which obviously answer to the two Big-trees, now peculiar to California, but several others; that they equally comprise trees now peculiar to Japan and China, three kinds of Gingko-trees, for instance, one of them not evidently distinguishable from the Japan species, which alone survives; that we have evidence, not merely of Pines and Maples, Poplars, Birches, Lindens, and whatever else characterize the temperate-zone forests of our era, but also of particular species of these, so like those of our own time and country that we may fairly reckon them as the ancestors of several of ours. Long genealogies always deal more or less in conjecture, but we appear to be within the limits of scientific inference when we announce that our existing temperate trees came from the north, and within the bounds of nigh probability when we claim not a few of them as the originals of present species. Remains of the same plants have been found fossil in our temperate region, as well as in Europe.

Here, then, we have reached a fair answer to the question, how the same or similar species of our trees came to be so dispersed over such widely separated continents. The lands all diverge from a polar centre, and their proximate portions, however different from their present configuration and extent, and however changed at different times, were once the home of those trees, where they flourished in a temperate climate. The cold period which followed, and which doubtless came on by very slow degrees during ages of time, must, long before its culmination, have brought down to our latitudes, with the similar climate, the forest they possess now, or rather the ancestors of it. During this long (and we may believe first) occupancy of Europe and the United States were deposited in pools and shallow waters the cast leaves, fruits, and, occasionally, branches, which are embedded in what are called Miocene Tertiary, or later deposits, most abundant in Europe, from which the American character of the vegetation of the period is inferred. Geologists give the same name to these beds in Greenland and Southern Europe, because they contain the remains of identical and very similar species of plants, and they used to regard them as of the same age, on account of this identity. But in fact this identity is good evidence that they cannot be synchronous. The beds in the lower latitudes must be later, and were forming when Greenland probably had very nearly the climate which it has now.

Wherefore the high, and not the low, latitudes must be assumed as the birth-place of our present flora;* and the present arctic vegetation is best regarded as a derivative of the temperate. This flora, which when circumpolar was as nearly homogeneous round the high latitudes as the arctic vegetation is now, when slowly translated into lower latitudes, would preserve its homogeneousness enough to account for the actual distribution of the same and similar species round the world, and for the original endowment of Europe with what we now call American types. It would also vary or be selected from by the increasing differentiation of climate in the divergent continents, and on their different sides, in a way which might well account for the present diversification. From an early period the system of the winds, the great ocean currents (however they may have oscillated north and south), and the general proportions and features of the continents in our latitude (at least of the American continent) were much the same as now, so that species of plants, ever so little adapted or predisposed to cold winters and hot summers, would abide and be developed on the eastern side of continents, therefore in the Atlantic United States and in Japan and Manchuria: those with preference for milder winters would incline to the western sides; those disposed to tolerate dryness would tend to interiors, or to regions lacking summer rain. So that if the same thousand species were thrust promiscuously into these several districts, and carried slowly onward in the way supposed, they would inevitably be sifted in such a manner that the survival of the fittest for each district might explain the present diversity.

Besides, there are resiftings to take into the account. The glacial period or refrigeration from the north, which at its inception forced the temperate flora into our latitude, at its culmination must have carried much or most of it quite beyond. To what extent displaced, and how far superseded by the vegetation which in our day borders the ice, or by ice itself, it is difficult to form more than general conjectures—so different and conflicting are the views of geologists upon the Glacial period. But upon any, or almost any, of these views, it is safe to conclude that temperate vegetation, such as preceded the refrigeration and has now again succeeded it, was either thrust out of Northern Europe and the Northern Atlantic States, or was reduced to precarious existence and diminished forms. It also appears that, on our own continent at least, a milder climate than the present, and a considerable submergence of land, transiently supervened at the north, to which the vegetation must have sensibly responded by a northward movement, from which it afterward receded.

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* This takes for granted, after Nordenskiöld, that there was no preceding Glacial period, as neither paleontology nor the study of arctic sedimentary strata afford any evidence of it. Or if there were any, it was too remote in time to concern the present question.

All these vicissitudes must have left their impress upon the actual vegetation, and particularly upon the trees. They furnish probable reason for the loss of American types sustained by Europe.

I conceive that three things have conspired to this loss. First, Europe, hardly extending south of latitude 40°, is all within the limits generally assigned to severe glacial action. Second, its mountains trend east and west, from the Pyrenees to the Carpathians and the Caucasus beyond, near its southern border; and they had glaciers of their own, which must have begun their operations, and poured down the northward flanks, while the plains were still covered with forest on the retreat from the great ice-wave coming from the north. Attacked both on front and rear, much of the forest must have perished then and there. Third, across the line of retreat of those which may have flanked the mountain-ranges, or were stationed south of them, stretched the Mediterranean, an impassable barrier. Some hardy trees may have eked out their existence on the northern shore of the Mediterranean and the Atlantic coast. But we doubt not Taxodium and Sequoias, Magnolias and Liquidambars, and even Hickories and the like were among the missing. Escape by the east, and rehabilitation from that quarter until a very late period, was apparently prevented by the prolongation of the Mediterranean to the Caspian and thence to the Siberian Ocean. If we accept the supposition of Nordenskiöld, that anterior to the Glacial period Europe was "bounded on the south by an ocean extending from the Atlantic over the present deserts of Sahara and Central Asia to the Pacific," all chance of these American types having escaped from or re-entered Europe from the south and east is excluded. Europe may thus be conceived to have been for a time somewhat in the condition in which Greenland is now, and indeed to have been connected with Greenland in this or in earlier times. Such a junction, cutting off access of the Gulf Stream to the polar sea, would, as some think, other things remaining as they are, almost of itself give glaciation to Europe. Greenland may be referred to, by way of comparison, as a country which, having undergone extreme glaciation, bears the marks of it in the extreme poverty of its flora, and in the absence of the plants to which its southern portion, extending six degrees below the arctic circle, might be entitled. It ought to have trees and might support them. But, since destruction by glaciation, no way has been open for their return. Europe fared much better, but suffered in its degree in a similar way.

Turning for a moment to the American continent for a contrast, we find the land unbroken and open down to the tropic, and the mountains running north and south. The trees, when touched on the north by the on-coming refrigeration, had only to move their southern border southward, along an open way, as far as the exigency required; and there was no impediment to their due return. Then the more southern latitude of the United States gave great advantage over Europe. On the Atlantic border proper glaciation was felt only in the northern part, down to about latitude 40°. In the interior of the country, owing doubtless to greater dryness and summer heat, the limit receded greatly northward in the Mississippi Valley, and gave only local glaciers to the Rocky Mountains; and no volcanic outbreaks or violent changes of any kind have here occurred since the types of our present vegetation came to the land. So our lines have been cast in pleasant places, and the goodly heritage of forest trees is one of the consequences.

The still greater richness of Northeast Asia in arboreal vegetation may find explanation in the prevalence of particularly favorable conditions, both ante-glacial and recent. The trees of the Miocene circumpolar forest appear to have found there a secure home; and the Japanese Islands, to which most of these trees belong, must be remarkably adapted to them. The situation of these islands—analogous to that of Great Britain, but with the advantage of lower latitude and greater sunshine—their ample extent north and south, their diversified configuration, their proximity to the great Pacific gulf-stream, by which a vast body of warm water sweeps along their accentuated shores, and the comparatively equable diffusion of rain through out the year, all probably conspire to the preservation and development of an originally ample inheritance.

The case of the Pacific forest is remarkable and paradoxical. It is, as we know, the sole refuge of the most characteristic and wide-spread type of Miocene Coniferæ, the Sequoias; it is rich in coniferous types beyond any country except Japan; in its gold-bearing gravels are indications that it possessed, seemingly down to the very beginning of the Glacial period, Magnolias and Beeches, a true Chestnut, Liquidambar, Elms, and other trees now wholly wanting to that side of the continent, though common both to Japan and to Atlantic North America.* Any attempted explanation of this extreme paucity of the usually major constituents of the forest, along with a great development of the minor or coniferous element, would take us quite too far, and would bring us to mere conjectures.

Much may be attributed to late glaciation;† something to the tremendous outpours of lava which, immediately before the period of refrigeration, deeply covered a very large part of the forest area; much to the narrowness of the forest belt, to the want of summer rain, and to the most unequal and precarious distribution of that of winter.

Upon all these topics questions open which we are not prepared to discuss. I have done all that I could hope to do in one lecture if I have distinctly shown that the races of trees, like the races of men, have come down to us through a prehistoric (or prenatural-historic) period; and that the explanation of the present condition is to be sought in the past, and traced in vestiges, and remains, and survivals; that for the vegetable kingdom also there is a veritable archæology.

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* See especially, Report on the Fossil Plants of the Auriferous Gravel Deposits of the Sierra Nevada, by L. Lesquereux, Mem. Mus. Comp. Zoölogy, vi, No. 2.—Determination of fossil leaves, &c., such as these, may be relied on to this extent by the general botanist, however wary of specific any many generic identifications. These must be mainly left to the expert in fossil botany.

† Sir Joseph Hooker, in an important lecture delivered to the Royal Institution of Great Britain, April 12, insists much on this.

Art. II.—On some new Batrachia and Reptilia from the Permian Beds of Texas.

By E. D. Cope.

PANTYLUS CORDATUS gen. et sp. nov.

Char. gen.—Represented by one species, which is as yet only known from crania. In these the superficial ossification is complete, leaving only nostrils, orbits, and parietal fontanelle. Surface sculptured. Mandible with an angular process. Teeth shortly conic, obtuse, and without grooves or inflections, increasing in size towards the anterior parts of the jaws. Mandible supporting several rows of teeth, which oppose a pavement of obtuse teeth on the palate. These are situated on either the palatine or anterior part of the pterygoid bones. Quadratojugal and malar bones well developed. No lyra or mucous grooves.

This genus is first of the *Stegocephali* from the Permian formation of Texas, whose cranial structures indicate a habit of obtaining nutriment by crushing hard bodies. Without vertebræ it is not possible to ascertain whether it pertains to the Microsaurian, Embolomeran or Ganocephalous divisions. It may be compared with the *Sparodus* of Fritsch in the general characters of its dentition, but may be easily distinguished from it by the numerous series of teeth on the mandibular rami. Some of these are on the dentary bone, while others are on an inner element, but whether opercular or splenial I cannot now determine.

Char. specif.—The skull of the *Pantylus cordatus* is about as large as that of a fully grown snapping tortoise, *Chelydra serpentina*, and has somewhat the same form of outline. The vertex is flat; the postorbital region is swollen, and the muzzle is abruptly acuminate. The orbits are lateral with a slight vertical exposure, and are widely separated. The front is deflected from opposite their posterior margins, and the muzzle protrudes considerably beyond the lower jaw. The premaxillary bones form a triangle whose apex does not appear on the superior surface of the muzzle, and the nares are rather close together, and lateral in their vertical presentation. The upper surface of the extremity of the snout is occupied by the large nasal bones, which are followed by the larger frontals. The lachrymal and prefrontal are both well developed, the latter extending backwards to meet the postfrontal near the middle of the superior border of the orbit. The posterior border of the skull is damaged, but enough remains to show that it was concave.

The symphysis mandibuli is short. The rami are wide, and are flat below, the inferior surface forming a rounded right angle with the interior surface. The angular process is in line with the external border of the ramus.

The sculpture of the cranium proper is strong, consisting of pits separated by strong, narrow ridges, forming a honeycomb pattern. The fossæ are smaller on the buccal regions. On the anterior part of the mandible the fossæ are distinct; on the median and posterior part the ridges become linear. A narrow triangular space on the external side posteriorly, with its long apex on the inferior margin, is smooth.

There are two subequal obtuse teeth, on the border of each premaxillary bone. I cannot count the number on the maxillary, but there are four anterior to the line of the anterior border of the orbit. Of these the next to the anterior one is larger than the rest, though of the same shortly-conic, obtuse form. These teeth are rather large for the size of the skull. At a point near the middle of the ramus of the mandible, where it is broken off, there may be counted five teeth in a transverse series. Of these the second from the external border is the largest, and has a regularly rounded crown. Six teeth may be counted on a transverse fracture of the palatine bone. Of these the four external have obtusely rounded crowns, and the third from the external border is the largest. The crowns of all the teeth are hollow.

Measurements.

	M.
Length of cranium to transverse line connecting posterior borders of quadrates	.077
Width between same points	.082
Length of axis of cranium to line connecting anterior borders of orbits	.018
Interorbital width	.032
Longitudinal diameter of orbit	.016
Length from orbit to nostril	.015
Projection of muzzle beyond mandible	.010
Length of alveolar edge of premaxillary	.007
Height of crown of large maxillary tooth	.0045
Fore-and-aft diameter of maxillary	.0035
Width of mandibular ramus below at middle	.020

This species considerably exceeds in size those referred by Dr. Fritsch to *Sparodus*, as it was probably rather larger than the *Protonopsides* of recent waters. Its physiognomy is peculiar, as the prominent muzzle and lateral orbits are unusual among Batrachia.

DIMETRODON SEMIRADICATUS sp. nov.

A considerable part of the skull and some limb bones represent this species. There are no vertebræ referable to the specimen, but the two maxillary and premaxillary bones support nearly all the teeth in an excellent state of preservation. Continuity of the dental series is preserved by one maxillary bone or the other, excepting just at the extremity, where there is a slight interruption on both sides. On one of them it must be very slight.

There are three teeth in each premaxillary bone. In the maxillary I count seventeen, with the bare possibility of a necessity for adding one more. The first premaxillary and third maxillary teeth are of nearly equal size and are much larger than the others, the second premaxillary only approaching them. The section of the base of the first premaxillary is subtrifoliate, there being one grove on the inner, and two on the external face. The section of the middle of the crown is more than a semicircle, with the base convex. The two angles are the sections of two ridges which are both presented posteriorly, the one on the inner the other on the external face of the crown. The crown of the second premaxillary has the same form, but the base has only slight traces of the grooves. The third premaxillary is a diminutive of the second.

The crowns of the maxillary teeth differ from those of the premaxillaries in the opposition of the cutting edges, which present anteriorly and posteriorly. The external face is more convex than the internal. The crown of the large third tooth is not expanded above the root, but its antero-posterior diameter contracts regularly to the apex. The crowns of the other teeth are wider at the base antero-posteriorly than the root. They are all slightly curved backwards, and their edges are more or less regularly crenate.

Several peculiarities distinguish this species from the *D. incisivus*, with which it agrees in size. In the first place, the section of the root, at and below the base of the crown of the third or large maxillary tooth and of the seventh tooth posterior to it, is of the form of a figure ∞ directed antero-posteriorly. This is due to the deep grooving of the tooth on the opposite sides at this point; the grooves not extending on the crown. The grooves are deeper on the smaller teeth, giving it an almost biradiculate character. In *D. incisivus* the sections of these teeth are subquadrate.

In the second place, the section of the base of the first incisor differs from that in *D. incisivus*, where it is subquadrate with two subopposite shallow grooves. Next, the nostril excavates the border of the maxillary bone; in *D. incisivus*, the nostril is separated from that bone by the intervention of the nasal. In that species there are but two premaxillary teeth; in *D. semiradicatus*, there are three. The teeth which accompany specimens of *D. cruciger* have the same form and proportions as those of the *D. incisivus*.

Measurements.

		M.
Length of dental series		.252
Length of premaxillary series (and bone)		.049
Length of diastema		.024
Length of first premaxillary tooth from alveolar border		.057
Diameter of first premaxillary tooth at alveolar border	anteroposterior	.022
	transverse	.015
Length of third maxillary from alveolar border		.067
Diameter of third maxillary at alveolar border	anteroposterior	.020
	transverse	.005

		M.
Diameter of third maxillary at base of crown	anteroposterior	.018
	transverse	.015
Length of seventh maxillary from alveolus		.026
Diameters of crown at base of cutting edges	anteroposterior	.012
	transverse	.009

The approximation to a two-rooted condition in some of the teeth is a marked peculiarity of this species. The median groove is most extensive on the smaller maxillary tooth, extending into the base of the crown. From observation on this species and on certain *Dinosauria*, I am under the impression that the two-rooted mammalian tooth is the result of constant absorption of the median portion of the wide root of a wide crown, due to the presence and pressure of the successional tooth.

DIMETRODON CRUCIGER Cope, Paleontological Bulletin No. 32, p. 7.

This species was abundant during the Permian period. One of the best preserved individuals in my collection is represented by the greater part of the vertebral column and the pelvic and scapular arches.

The pelvic arch resembles that of the *D. gigas* in its general characters. For a description of the latter see Paleontological Bulletin No. 32, p. 6. The scapular arch also agrees with the descriptions I have given, but possesses some parts which have been hitherto wanting. These are the clavicles, as I suppose them to be. Each of these consists of a horizontal portion and an ascending portion. The former is nearly a quarter of a circle in form, with its convex outline presenting inwards and backwards. The border is marked by radiating ridges which terminate in a suture-like rugosity of the edge. The lower surface curves rapidly into the ascending portion, which is narrow and acuminate and about twice as high as the horizontal portion extends inwards from its interior border at the base. It displays on its external border an extensive sutural surface for union with the scapula. The anterior extremity of the epicoracoid lies on the superior (internal) face of the horizontal portion of the clavicle, extending nearly to its anterior border. Its external margin thins out in contact with the clavicle.

The above structure is peculiar among *Reptilia* in the widely-expanded subtriangular distal part of the clavicle. It presents no greater resemblance to any known mammal. Its character is more that of the Stegocephalous *Batrachia*, and it is a good deal like the lateral thoracic shield of the animals of that group, as, for instance, *Actinodon* of Gaudry and *Cricotus* m. From the sutural character of the borders of this part I anticipate the discovery of a median or mesosternal element. It is possible that the piece attached to its superior face, which I have above alluded to as epicoracoid, may be a part of this bone displaced laterally.

The resemblance of the humerus of this and of allied genera to that of the mole was reported by the writer in the American Naturalist, 1878, p. 408 (June), and the nearer resemblance to *Echidna* was asserted in the same journal, 1878, p. 830 (December).

Art. III.—On a Wading Bird from the Amyzon Shales.

By E. D. Cope.

The formation which I have called the Amyzon Shales is a lacustrine deposit of Tertiary age which is found in the South Park of Colorado, in Northeastern Nevada, and probably in Central Oregon.* Its material is laminated, and is occasionally highly carbonaceous. It contains many specimens of fossil fishes, of plants, and of insects, and allied articulates. Its age is uncertain, but it is probably near the Upper Eocene or Lower Miocene. Remains of birds are very rare, the best-preserved specimen yet found being that of a Passerine species. Under the impression that it belongs to the *Fringillidæ*, Mr. J. A. Allen describes it under the name of *Palæospiza bella.*†

The present communication relates to a second species of bird from the same formation. The specimen includes three vertebræ anterior to the pelvis; the pelvis, with the vertebræ which it incloses, and the caudal vertebræ; both femora; the tibia and part of the tarsometatarse of the right leg, with the greater part of the left tibia. One-half of the tail is preserved, the feathers lying in almost undisturbed relation. There are also various light and downy feathers of the base of the tail and adjacent parts of the body lying on the block, some in place, others loose.

The characters displayed by the bones and feathers are those of a species of the order *Grallæ* and tribe *Limicolæ* (*Totanideés* A. Milne Edwards). In the absence of important parts of the skeleton, it is not possible to ascertain the family characteristics, but it is more easy to assign the species to its genus. I cannot detect any features which forbid its reference to the genus *Charadrius* in the large sense. It presents important resemblances to the species of *Totanus*, but there are some reasons, to be mentioned later, why this reference is inadmissible. It is clear that there are various genera of *Scolopacidæ* to which it cannot be referred, on account of the form of its *ossa ischii*. I therefore introduce it to the scientific record under the name

CHARADRIUS SHEPPARDIANUS.

Chars.—Femur one-half the length of the tibia; nine caudal vertebræ; tail gently wedge shaped, apparently without color cross-bars.

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* American Naturalist, May, 1879.

† Bulletin U. S. Geol. Survey Territories, Vol. IV, 1878, p. 443, Pl. I.

Description.—The preiliac vertebræ are distinct from each other and have only moderately elongate centra. The diapophyses are of moderate length and less width, and are truncate at the extremity. Those of successive vertebræ are connected by but few osseous ligamentous spicules. The caudal vertebræ are short and wide, and have short diapophyses, except the first, which has a long narrow diapophysis. The last three are in profile, and do not display hypapophyses. The ploughshare bone is an elongate triangle, considerably produced to its superior angle. The basal cotylus for articulation with the centrum immediately in front, is well excavated.

The pelvis is short and rather wide posteriorly. The fossil presents a superior view of it, with both the pubic bones turning their external faces upwards. The external borders of the anterior plates of the ilia are broken away, but enough remains of their inner portion to show their anterior extent. The postacetabular ridges diverge outwards and terminate in a prominent angulation of the posterior border which is about equidistant between the vertebral border of the ilium and the externo-inferior border of the pubis. The posterior outline thus differs from that seen in various genera of *Scolopacidæ*, where the angle is much nearer the vertebral border, and where a second angle is produced by a notch at the point of junction of the ischium. The pelvis of *Totanus* is however, much like that of the present species. External to the angular projection described, the border is notched, and then turns posteriorly, forming a gentle curve, which continues from the ischium to the slender pubis. The pubis is long and very narrow, and extends well posterior to the ischium. It is of uniform diameter, and is not expanded distally. The ischiopubic foramen is long and narrow, about one-seventh as wide as long. The obturator foramen is about one-third the length of the ischiopubic, and is oval. A transverse line cutting the anterior border of the acetabulum divides the pelvis between the posterior angular projection of the ilium (the true crest, *fide*, Gegenbaur) and the anterior extremity, into two parts of equal length.

The leg bones are quite slender, and are similar in proportions to those of several species of *Charadrius* and *Totanus*. They are more slender than in various species of *Scolopax*, *Strepsilas*, *Tringa*, &c., and less so than in *Himantopus* and *Recurvirostra*. The former is just half as long as the tibia, and seen in profile is almost straight. The crest of the tibia is very prominent, but is not produced proximally. The distal extremity of the tibia and proximal part of the tarsometatarse are so damaged as not to furnish satisfactory characters.

There are five rectrices visible in the specimen. Those which are in all probability median are the longest, while the external two are of equal length. This gives the outline a rather short wedge shape as the feathers lie closed. The expanded tail would be rounded with a slight median angulation. The extremities of the feathers are rounded, and their whole structure is soft and delicate. The length of the longest rectrix is just about that of the tibia.

Measurements.

	M.
Length of the preiliac vertebræ	.010
Length of centrum of first vertebræ	.0035
Length of sacrum	.021
Length of caudal vertebræ on curve	.0145
Length of plowshare bone to apex	.005
Length of ilium	.024
Length of ilium to acetabulum	.012
Length of ischium from acetabulum	.016
Length of pubis from acetabulum	.019
Width between posterior angles of ilia	.009
Length of femur	.024
Diameter of femur at middle	.003
Length of tibia	.047
Antero-posterior diameter at head	.006
Diameter of shaft at middle	.0027
Diameter of head of tarsometatarse	.004
Length of median rectrix from plowshare bone	.046
Length of external rectrix from plowshare bone	.040
Width of portion of tail preserved	.020

The strongly contrasted light and dark shades of color are not unfrequently preserved in the insects of this formation. I suspect that had the rectrices of this species originally displayed the alternating white and dark cross-bars characteristic of the *Totani*, some trace of them would be discoverable in the fossil, in spite of the fact that the entire feather is represented by carbon only. The brown tint of the specimen, both light and dark, is uninterrupted by pattern of any kind.

The tail is rather longer than in the *Tringæ*, about equal to that of many plovers and *Totani*, and shorter than that of *Actiturus*.

The *Charadius sheppardianus* was discovered near Florissant, Colorado, by Dr. G. Hambach, a skillful naturalist. I have named it in honor of Edwin Sheppard, of Philadelphia, an excellent ornithologist and skillful artist.

Art. IV.—Osteology of Speotyto Cunicularia var. Hypogæa.

By R. W. Schufeldt, Acting Assistant Surgeon, U. S. Army.

In the United States we have but one species of Burrowing Owl, and this is a variety only of the bird found in South America. Our bird occurs on the prairies west of the Mississippi, notably in the villages of species of marmot squirrels, the deserted burrows of which it occupies for the purpose of nidification. Its behavior and habits are extremely unique and interesting. Perhaps no species in the great order to which it belongs have less limited power of flight, none so habitually congregate together in certain localities and choose the open, treeless country as their resort, and make their nests underground. So, in the study of the bony framework of this bird we may expect to find it modified to correspond with these habits, and presenting equal points of interest. Without further remark, then, upon its natural history, we will proceed to an examination of its skeleton. In enumerating and describing the separate bones, smaller sesamoids than the patellæ and the ossicula auditus (two of the latter bones being merely represented in cartilage) will not be taken into consideration. The latter are more properly treated in the study of the organ of hearing.

The skull.—As a general rule, it is only in the young of the Class *Aves* that the many bones of the skull can be separated from one another; the majority of the primitive segments of ossification of the four vertebræ that go to form this, the superior expansion of the vertebral column, being firmly anchylosed together, with their sutures completely obliterated when the bird has attained maturity. This is eminently the case in the adult skull of the species we have before us, so much so, in fact, that, with the exception of certain bones that remain permanently free during life, we will undertake to describe the skull only as it presents itself to us in the adult as a whole. In referring to certain points for examination, then, in this part of the skeleton, we will have to rely largely upon the reader's familiarity with general anatomy, the extent and position of the bones as they occur in the variously shaped heads of immature birds, and as to which of the two divisions of anthropotomists and some comparative anatomists, "bones of the cranium" and "bones of the face", they belong. The major part of the occipital lies in the horizontal plane, only that portion which originally constituted the superoccipital segment and the posterior third of the exoccipital segments curving rather abruptly upwards to meet the mastoids and parietals. All its primary parts are thoroughly coalesced, and its articulations with the surrounding bones obliterated, save a fine ridge, running transversely, just anterior to the condyle, separated from it by a depression which seems to indicate the remains of the occipito-basi-sphenoidal suture. Posterior to the foramen magnum the bone rises and displays a well-marked "cerebellar prominence", with a depression on either side of it. On the summit of this prominence, in the median line, just before we arrive at the foramen magnum, we find the superoccipital foramen. This foramen varies in size and shape in different individuals—in size, from one to two millimetres; in shape, from a circle to a transverse ellipse, though it is usually small and circular. It is said to be formed by a thinning of the bone due to muscular pressure from without and the pressure of the cerebellum from within; in the fresh specimen it is covered by a thin membrane. Lying in the horizontal plane, anterior to the cerebellar prominence, is the foramen magnum. In shape it resembles a square with the four angles rounded off. Its average measurement is five millimetres transversely and four millimetres antero-posteriorly, the latter diameter being encroached upon by the occipital condyle in the median line. The occipital condyle is sessile, though raised above the level of the basis cranii, hemispheroidal in form, with a minute notch marking it posteriorly in the middle. Immediately beyond the condyle appears a depression, on either side of which are seen the precondyloid foramina for the transmission of the hypoglossal nerves; they are extremely small, and open anteriorly. External to these, lying in the same line transversely, is seen a group of usually three foramina for the passage of the eighth nerve and the internal jugular vein. The lateral terminations of the occipital, the paroccipital processes, are large, thin, pointed forwards, and on a lower level than the rest of the bone, forming a large part of the floor of the tympanic cavity. The semi-elliptical contour of the cranium, regarding it from a basal view, is well carried out laterally by the wing-like and attenuated mastoids. They contribute largely to the formation of the walls of the tympanic cavity internally, and externally assist in some degree towards completing the temporal fossæ. These fossæ are deep; commencing posteriorly on either side at the external borders of the depressions already mentioned that bound the cerebellar prominence laterally, they take a course upwards and outwards, terminating at a foramen that lies just within the posterior periphery of the orbit, which foramen allows the passage of the tendon of the temporal muscle. From the upper boundary of the temporal fossæ to where the frontals suddenly abut against and even overhang, to some extent, the nasals, the external and superior surface of the skull is of a pearly whiteness and very smooth in the dry skeleton, presenting not a trace of the sutures between the bones that go to form it, the frontals and parietals. This surface is divided by a well-marked furrow, that extends in the median line between the cerebellar prominence and the upper mandible. It is deepest in the parietal region. Close inspection of this area reveals minute ramifying grooves for the lodgment of vessels, one set running in the direction of the temporal fossæ and another towards the orbits. In the "bird of the year" the skull-cap is very thin and brittle in the dry condition; but a very different state of affairs presents itself when we remove a section of the cranial vault from above, in the adult, where the skeleton is full-grown, such as we have before us. We find exposed to our view one of the common characteristics of the family; the two tables are light, thin, but compact, with a goodly supply of diploic tissue between them, attaining a thickness in some localities, notably above the exit of the olfactories, of two millimetres or more. Owing to the large orbital cavities, the brain-case is crowded to the rear to such an extent that the fossæ for the cerebral hemispheres are situated immediately over the cavities intended for the other encephalic lobes. We find the internal opening of the foramina, already described, at the base of the brain. The *petrosals* have the appearance of two white leaves, harder than the surrounding bone, slightly turned upon themselves, with their stems leading towards the fossa for the hypophysis. They present for examination the openings for the portio dura and portio mollis, the former foramen being on a lower level and anterior to the latter. In the median line running from the cerebellar fossa to the exit of the first pair of nerves along the roof is a raised crest, grooved on its summit for the longitudinal sinus. It sinks for a little distance, in the fresh specimen, into the cerebral interspace. The "sella turcica" is deep, its long axis being perpendicular to a plane passing through the foramen magnum. It has at its base the openings for the carotids. Immediately beyond its anterior superior border is seen the niche, with its foramen at either end, for the passage of the optic nerves and lodgment for the optic chiasma. Above the optic foramina, situated still more anteriorly, is a conical pocket, pointing forwards and a little upwards, with the olfactory foramina at its apex, two in number, giving passage for the nerves to the orbits. The *basi-sphenoid* is thoroughly united with all the bones it comes in contact with, except the pterygoids, palatines, and tympanics. Its anterior process—the basi-presphenoid—loses itself with the vomer in the interorbital septem, not a trace remaining of the original margins of the two bones. Its wings, the orbits, and the ali-sphenoids share the same fate with the bones that surround them. They form the larger part of the posterior wall of the orbital cavities. With the body of the bone the ali-sphenoids assist in closing in the tympanic cavities. The "pterapophysial" processes of the basi-sphenoid are present; they are short, thick, and elliptical on section, crowned by facets of the same figure at their distal extremities, which look downwards, forwards, and outwards, articulating with a similar facet at the middle, third, and posterior border of each pterygoid. The bone also presents for examination the usual nervous and arterial foramina and grooves for the Eustachian tubes, the foramina being particularly worthy of notice on account of their marked individuality, all of them being distinct and nearly circular. The *tympanics* are free bones, and carry out all the usual functions assigned to them. The mastoid condyle is long, affording by its extension an additional margin at the under side at the end of the bone for attachment of the ear-drum; the neck between it and the orbital process is somewhat constricted, and presents a large pneumatic foramen on the inner surface. The pointed orbital processes extend upwards, forwards, and inwards, slightly clubbed at their extremities; they project into the space half-way between the pterygoid and wing-like post-frontal. The mandibular condyle is double; the inner one is a semi-ellipsoid, placed transversely; the outer an irregular figure, and separated from the inner by a shallow pit. The oval, cup-shaped cavity for the reception of the tympanic extremity of the squamosal looks directly forward. Between the orbital process and inner mandibular condyle, on the free edge of the bone, is seen a small articular surface for the tympanic extremity of the pterygoid. The *pterygoids* diverge from each other towards the tympanics by a very open obtuse angle. They are slender and scale-like, being compressed from above downwards, twisted on themselves at their tympanic extremities, causing the long axis of the articular facets for the articulation with these bones to be vertical. As already described, they have a mid-posterior facet, which meets the pterapophysial process of the basi-sphenoid. Anteriorly they do not touch each other, but articulate with the extremities of the palatines, and the combined four bones touch, and in the living bird glide over for a limited distance the lower border of the rostrum of the basi-presphenoid. The anterior ends of the *palatines* articulate by an anchylosed schindylesial articulation between the lower surfaces of the maxillaries and the thin upper surface of a bony process extending backwards from the intermaxillary. From this point they slightly diverge from each other and become broader, being broadest about their middles; they then rather abruptly approach each other posteriorly, where they form the joint with the pterygoids already described. Their posterior ends are kept slightly apart by the lower border of the presphenoid. They are flattened from above downwards throughout their entire extent. Their outer borders are sharp, and form from one end to the other a long convexity. As the inner and concave borders approach each other posteriorly they develop a raised rim on their under sides, thereby affording a greater surface for muscular attachment. Above, near their middles, they aid the maxillaries (and in large part developed from them) in supporting on either side an irregular spongy bone, that serves the double purpose of narrowing the apertures of the posterior nares and adding bony surface to the roof of the mouth by constriction of the palatine fissure. As is the rule in nearly all birds, the tympanic end of the *infraorbital bar* is on a lower level than the maxillary extremity; it is received into the cup-like articulating cavity on that bone. The two oblique sutures, persistent in many birds, and denoting the original division of this bony style into three separate bones, the maxillary, malar, and squamosal, are here entirely effaced. As a whole, it is compressed from side to side, and of ample size in comparison with other bones of the head. At about the locality of the malo-zymotic suture the bone throws upwards a thin expansion that meets the descending postfrontal, thus completing the orbital circumference at that point. Its anterior and fixed extremity is made up by the maxillary, Here it forms externally a portion of the posterior surface of the bill. while internally it assists in forming the roof of the mouth and floor of the nasal cavities, and otherwise behaves as already described. The *lachrymals* are extremely spongy in texture, covered by an outside delicate, compact bony casing. They articulate above by a ginglymoid joint with the posterior border of the nasals, resting below on the spongy bones developed from the superior surfaces of the maxillaries. They are limited to a slight movement inwards and outwards, and aid in separating the orbital cavities from the rhinal chamber. Externally they present for examination a shallow groove traversing the bone obliquely downwards and forwards and a little inwards for the lachrymal duct. The orbital cavities are very large, and remarkable for the completeness of their bony walls and the near approach their peripheries make to the circle, any diameter of which measures the merest trifle above or below two centimetres. The septum in the adult bird has rarely more than one small deficiency of bone in it. This usually occurs in about the position shown in Pl. I. The sutures among the various bones have entirely disappeared, nothing being left to define the exact outline of the vomer especially. The groove for the passage of the olfactory nerves forward is well marked, the cranial foramina for them being distinct, one in each orbital cavity. This also applies to the openings for the optic nerves. The extent of the roof is increased on either side by a superorbital process (shown in Pl. II, Fig. 1) that points downwards, backwards, and outwards, and serves for membranous attachment. The posterior walls are marked by ramifying grooves for vessels. They have a direct forward aspect, which is enhanced by the low descent of the broad and thin postfrontals. Anteriorly, the aperture between these and the rhinal vacuities is diminished by the lachrymals externally and by a wing-like plate thrown off from the prefrontal internally. This latter bone here terminates in a sharp concave border, with a descending ridge on either side just within it. The floors of the orbits are more complete than is usually seen in the class, due to the flatness and position held by the pterygoids and palatines, the wing-like process of the ethmoid just referred to, and the pterapophysial processes of the basi-sphenoid. The *sclerotals* number from fifteen to sixteen, all of them being about the same length, but varying as to their width; in figure they are trapezoidal and universally oblong, with the short parallel side in the circumference of the cornea and the opposite one resting in the periphery of the posterior hemisphere. We have never observed one that was wide enough to appear square.

They are rather thin, concave outwards, very slightly movable at their opposed edges, and carry out their usual function of maintaining the form of the optical apparatus. The orbital periphery very nearly fulfills that rare condition in birds of a complete bony circuit. It is only deficient at the point where the lachrymal fails to touch the maxillary. The *upper mandible* of this bird is made the more conspicuous and distinct from the remainder of the skull by the abrupt way in which it is attached and the much firmer texture of the bone. The mandibular culmen is perfectly convex from the tip of the sharp-pointed extremity to where it suddenly terminates under the slightly overhanging frontals, or, more correctly, the minute surface appearance of the prefontal, for although it is not evident in the adult that that bone makes itself visible at this point, yet it may be demonstrated in skulls of younger specimens. The culmen, as in other birds, is formed by the intermaxillary, which is here firmly united with the nasals, and the two in conjunction form the peripheries of the truly elliptical external nasal apertures or nostrils, the first bone bounding them anteriorly, while the latter completes their arcs in the rear. These in the dry skull measure through their major axes seven millimetres, and through their minor ones barely five millimetres. They have a distinct ring raised around their circumference, which is wanting, however, where they nearest approach each other anteriorly at the culmen. The plane of the nostril faces upwards, outwards, and forwards; the nostrils are completely separated from one another by a vertical bony septum, developed from the intermaxillary, not a common occurrence in birds. They have, in addition, a concave bony floor, that rises behind into a posterior wall, leaving really two semicircular openings just beneath the culmen, separated from each other by the vertical septum. The osseous mandibular tomium, also a part of the intermaxillary, is as sharp as when the bill is sheathed in its horny integument. The arc is concave, and falls off rapidly as it approaches the tip of the beak. Occasionally, in very old birds, the *ethmo-turbinal* bones in the nasal passages may ossify. The *nasals* form here the sides of the bill, and are firmly anchylosed to the bones they meet, except the lachrymals. The movability of the fronto-mandibular articulation is limited. The dry skull is extremely light and brittle, giving one the sensation in handling it that he might experience while examining an egg from which the contents had been removed. A line drawn from the tip of the upper mandible to the outermost point of one tympanic, around the arc of the cranium to a similar point on the opposite side, and back to the point of departure, describes nearly the sector of a circle. The longest radius, which is in the median line, measures four and one-half centimetres, the chord between the tympanics about three centimetres.

The hyoid arch.—The hyoid arch is suspended from the base of the skull by its usual attachments. In this Owl it consists of but six very delicate little bones, involving five articulations. The tips of the upturned posterior extremities are about opposite the lower borders of the temporal fossæ, its two limbs diverging from each other at an angle equal to that made by the lower mandible. The cerato-hyals are rather large in comparison with the other bones. They are joined both anteriorly and posteriorly by bony bridges, forming a fenestra between them, to be filled in by a thin membrane. The amount of divergence they make from each other is less than that made by the hypo-branchial elements of the thyro-hyals. Anteriorly, the bone connecting them supports a cartilaginous glosso-hyal, while the posterior connection presents for examination the usual smooth articulating surface that enters into the arthrodial joint it makes with the basi-hyal. The basi-hyal and uro-hyal are confluent, not a sign of the point of union remaining. The latter bone is continued a short distance posteriorly by a tip of cartilage. The anterior end of the basi-hyal is devoted to the articular surface for the bone connecting the cerato-hyals, forming the joint mentioned above. It is concave from above downwards, convex from side to side, the lower lip being the longer. It will be plainly seen that this combination grants to the tongue a movement in the vertical and horizontal planes. The anterior articulating heads of the hypo-branchial elements of the thyro-hyals are opposite each other, each being received into the diminutive acetabulum intended for it at the side of the united basi and uro-hyals, and most probably at the junction of the two latter bones. These two elements are long bones having a cylindrical shaft, terminating at either end in an articulating head. They are the longest bones in the hyoid arch, and have a gentle curvature upwards throughout their extent The inner heads form an arthrodial joint on either side with the outer heads of the cerato-branchial elements of the thyro-hyals. These, the last bones of the arch, are joined in the manner already shown above. Their inner ends are quite pointed, even as far as the bone goes, the extreme points being finished off with cartilage. They curve upwards from about their middle thirds, and, like the first elements of the thyro-hyals, they are long bones, but with curved cylindrical shafts, the outer end, however, being the only true articulating one.

The lower mandible—(Pls. I and II, Fig. 3.).—That portion of the bone which originally was separate as the dentary element, and as far back as to include the interangular vacuity, is firm and compact, while the remainder has much the same character as the bones of the cranium, being cellular and light, having only a very thin outside layer of the harder tissue. All of the primary segments are firmly knitted together, the only sutural trace to mark the margins of any one of them being the posterior border of the dentary elements as they bound the fenestra before and slope away beneath it. The articular extremities are some little distance below the upper outline of the bone. Their superior surfaces are indented so as to accurately receive the condyles of the tympanics on either side, forming the joint that allows the opening and closing of the mandibles. Their under surfaces are smooth and rounded, having a fine ridge running across them transversely. Internally they are drawn out gradually into subcylindrical processes that point upwards, inwards, and a little forwards, exhibiting superiorly on each, about the middle, an oval pneumatic foramen. The upper edge rises rather abruptly from the articular ends, presenting as it arrives near the general level a rudimentary coronoid for the insertion of the tendon of the temporal. With the exception of a little elevation where the dentary element meets the surangular, the superior outline is unbroken; it falls away rapidly as it approaches the symphysis, where, with the opposite border, it completes a little notch at the extremity. The tomium is not as sharp as in the upper bill, and the mandibles do not fit nicely to each other until covered with their horny sheaths. The inferior border is rounded throughout its extent, and on a level at its posterior commencement with the under surfaces of the articular ends and running nearly parallel with the superior. The curve described by the rami before they meet at the symphysis inferiorly approaches the parabola in outline. The sides of the jaw are nearly smooth internally and externally. The vacuity that occurs in so many birds at the junction of the middle and inner thirds is rather large, long, and spindle-shaped, and filled in, in the fresh state, by an attenuated membrane.

The spinal column; cervical portion.—There are fourteen cervical vertebræ, each one having a more or less free movement with the one beyond and behind it, maintaining in all positions some variation of the usual sigmoid curve observable in the division of the vertebral column throughout the class. The arrangement, as well as the direction, of the planes of the zygapophysial articular surfaces allow considerable rotary movement in the vertical plane, with combinations of the two. It is a common habit of this bird, among other of his antics, to duck his head smartly downwards and again upwards, several times in succession, upon being approached. The relative position of the cervicals has been figured in Plate I from the dead bird, placed in the act of this particular manœuvre, in a specimen after careful dissection. The calibre, as well as shape, of the neural canal in this portion of the spinal column varies at different points. It originates at the atlas as a transverse ellipse, with a major axis of four millimetres and a minor axis of a little less than three millimetres; this is about the maximum capacity throughout the entire canal. From the atlas to the sixth or seventh vertebra the ellipse gradually approaches the circle, with a marked diminution in size, its diameters being at the seventh about two millimetres in any direction. From this point to the twelfth, inclusive, it rises as it fell, from the atlas, and in the same manner, when we again discover a transverse ellipse, perhaps a jot smaller than the one described in speaking of the atlas. In the thirteenth the canal is smaller than, though in all other respects resembles, the twelfth, but an abrupt change takes place in shape as we pass to the fourteenth or last cervical, where the form of the neural tube suddenly approximates the circularity of the dorsal vertebræ. The vertebral canal begins, circular, on either side at the third cervical vertebra, most of its length being immediately beneath the prezygapophyses of each segment. It is formed in the usual manner by the di- and par-apophysial processes uniting laterally with the pleurapophysial elements. Small at the cephalic extremity of the column, its calibre gradually increases in each vertebra as we proceed toward the thoracic extremity, until it attains its maximum capacity at the eleventh vertebra. In the twelfth the integrity of its walls is lost by a parting of the par- and pleur-apophysial elements, with a disappearance of the former, leaving it no floor, so that in this vertebra it ceases to be a closed canal. The most prominent object presenting itself for examination in the atlas, superiorly, is the deep reniform cavity for articulation with the occipital condyle of the basi-cranii. It makes up to the entire superior articulating surface of what would first appear to be the centrum of this vertebra, unless we should not consider such to be the case until the odontoid process of the vertebra next below, the true centrum of the atlas, lends its assistance, in which event the surface of this articulation is only complete when made so by the extremity of the process just alluded to. A membrane, however, always stretches across this interspace, separating the extremity of the odontoid from the condyle of the occiput. This is not invariably the case, either, as in many of the individuals we have examined a minute vacuity usually exists, allowing the process to come in immediate contact with the condyle at one point. Below and posteriorly there is another articulating surface, convex for the centrum of the axis and concave for its odontoid process, accurately meeting the opposed surface of this vertebra and forming the atlo-axoid articulation. A lip of bone, a portion of the hypapophysis of the vertebra we are now describing, projects downwards and shields this joint in front, overlapping, indeed, a good part of the axis. The neurapophyses of the atlas are slight in structure. The concave postzygapophyses articulate with the convex prezygapophyses of the axis. The bone is devoid of a neural spine. In the axis we find both an hypapophysis and neural spine developed, the former being produced from the ridge on the anterior aspect of the centrum of the bone. The odontoid process arises vertically from the posterior margin of the upper surface of the centrum. Its summit and anterior face are convex and articulating, while behind it is flat and continuous with the spinal canal. The facet for articulation with the centrum of the third vertebra looks downwards and inwards, is convex from side to side and concave in the opposite direction. The postzygapophyses are concave, look downwards and outwards, the conditions in the prezygapophyses being exactly the opposite; this is the rule throughout the cervical portion of the column. After we pass the atlas and axis, we find in the third cervical vertebra here, as in most vertebrates, parts that are common to the series of this portion of the column, deviating but slightly from each other as we examine them in seriation; but gradually as this deviation proceeds, some requisite condition is brought about when the climax is attained. The fact of the presence of a neural spine on the axis is conveyed, though in a less marked degree, to the third or next vertebra below, where it occupies a position about in the middle of the bone. As we descend, this process becomes less and less prominent, being found set further back on each successive vertebra; it disappears about entirely at the tenth, after which it rapidly begins to make its appearance again, assuming its former position in the middle of the vertebra, being quite evident in the twelfth in the shape of a pointed spine, while in the fourteenth it bears the quadrate form, with extended crest, being the first step towards an assumption of that notorious feature found further on in the dorsals. In the third vertebra the space between the pre- and post-zygapophyses is almost entirely filled in, a minute foramen on either side alone remaining, by a lamina of bone extending from one process to the other, giving to this vertebra a much more solid appearance, which in reality it possesses above that attained by any of its fellows. This bony lamina is reduced in the fourth vertebra to a mere "interzygapophysial bar" connecting the processes, while in the next succeeding one or two vertebræ it occurs only on the prezygapophyses more as a tubercle, being directed backwards, then disappearing entirely, is to be found again only on a few of the last cervicals as an ill-defined knob, still retaining its original position. The diapophyses at first project nearly at right angles from their respective centra, then approach the median line by being directed more backward near the centre of the cervical division of the column, and on nearing the dorsals again gradually protrude more and more directly outward. The prezygapophyses of the ninth cervical support well-marked unapophysial tubercles, which are feebly developed also on a vertebra or two both above and below the ninth. The joints between the bodies of the cervicals of this Owl are upon the same plan as those found throughout the class; the anterior facet being concave from side to side, convex from above downwards, the reverse being the case with the posterior facets, and when articulated fitting accurately into each other. The pleurapophysial elements, well-marked in all the cervicals after passing the axis, become in the thirteenth vertebra a free cervical rib, about three millimetres in length, without neck or true head, being merely suspended on either side from the diapophysis of the vertebra, and freely movable on its exceedingly minute articulating facet.

Attached to the last cervical we find the second pair of free pleurapophyses, about two-thirds as long as the first pair of dorsals or true ribs of the thorax, terminating in pointed extremities and articulating with the vertebra by both capitula and tubercula, the former on elliptical facets, placed vertically on either side of the centrum at the anterior margin of the neural canal, and the latter on rounded facets beneath the diapophyses. The tubercle on one of these ribs is nearly as long as the neck; at the junction on the posterior side is found a pneumatic foramen of considerable size. These ribs are more or less flattened above, from before backwards being convex anteriorly, concave posteriorly, becoming rounded below. From the third to the ninth vertebra, inclusive, appear beneath the vertebral canal anteriorly well-developed styliform parapophysial processes, directed backwards and downwards. They are best marked on the segments of the middle of the neck. There is no instance in this bird of these processes being produced so far backwards as to touch the next vertebra below; their tips, as a rule, about overhanging the middle of the centrum of the vertebra to which they belong. We have found in specimens of *Bubo virginianus* the parapophyses of the fourth vertebra overlapping and touching the fifth for a millimetre or more. The third and fourth cervicals have, beneath in the median line posteriorly, strongly developed hypapophyses, quadrate in form, a process that exhibits itself on the fifth vertebra, anteriorly, merely as a small tubercle. On the sixth this tubercle has disappeared, and has been supplanted by two others that are now found just within the periphery of the anterior facet of the centrum on the parapophysis of each side, beneath and inclined toward each other. These processes, now a double hypapophysis apparently developed from the parapophyses, continue to increase in size and inclination towards each other on the next three vertebræ, so that on the ninth, where they last appear, they nearly form a closed canal. The passage between them is intended for the carotids, to which they afford protection. The hypapophysis of the tenth, eleventh, and twelfth vertebræ is single, large, quadrate, and directed forwards and downwards. There are three on each of the last two vertebræ, each having an independent root, the two lateral ones directed downwards, forwards, and outwards, with characteristics similar to the one in the median line. Several pneumatic and nutrient foramina perforate each cervical vertebra at various points, except in the axis and atlas, where, after diligent search, aided by the lens, we have signally failed to discover them.

Dorsal vertebræ; vertebral and sternal ribs; sternum.—The dorsal vertebræ number five; the anterior one articulates with the last cervical and the last dorsal with the first sacral. Although the dorsals of this bird fit very snugly to each other, it requires no further masceration to separate them from one another than it does to remove the ribs from their attachments. This close interlocking, however, greatly diminishes the movement of this division of the spinal column, bestowing upon it a rigidity only exceeded by the anchylosed vertebræ of the sacrum; yet, it must be understood, they do enjoy, in this Owl, a considerable degree of movement, especially laterally. The neural spines have here attained their maximum development, forming, when taken together, an elevated and compressed median crest, with a thickened summit, and having a firm hold upon the remainder of the vertebræ below. Taken separately, the last is the smallest, the fourth next, the first next, and the second and third the largest. Their anterior and posterior borders are concave, allowing, when articulated, spindle-shaped apertures to exist among them, while their summits are produced backwards and forwards, thickened, and wedged into each other. This wedging is performed in the following manner: The posterior extremity of the crest forming the summit of the neural spine of the first dorsal divides and receives the anterior extremity of the crest of the second. This same arrangement exists between the second and third, and at the summit between the third and fourth, but the fourth immediately below the junction also divides for a little distance and receives the edge of the posterior rim of the third, just beneath the union of the crests. This latter method of joining is feebly attempted between the fourth and last. (See Pl. I.) The neural canal is nearly cylindrical in the dorsal region, its calibre being less at the sacral extremity, and rather compressed from side to side, as are the centra as we approach that end, each one being a little more so than its neighbor beyond. Viewing these five vertebræ from above in the articulated skeleton, we observe the spinous crest already described; we are struck with the regularity with which the postzygapophyses overlap and adjust themselves to the prezygapophyses from before backwards, like the scales in some fishes, the facets of the former facing downwards and outwards, the opposed surfaces of the latter facing upwards and inwards. The neurapophyses are horizontally compressed and rather broad; the diapophyses jut from them at right angles from points about their middles. There is an inclination for the latter to be directed slightly backwards as we near the sacrum. The diapophysis of the first dorsal is the shortest and stoutest, that of the last the most delicately constructed. Superiorly, these processes support metapophysial ridges at their extreme outer borders. These ridges on the diapophyses of the first dorsal are the largest, rounded at both ends, extending a little both backwards and forwards, but far from touching the ridge either in front or behind them. The metapophysials of the last dorsal are smaller, sharp, styliform, and project only forwards, though they do not by any means touch the diapophyses in front of them. On the intermediate vertebra they change gradually between these two extremes, but in no instance meet the diapophyses of the vertebra before or behind them, and thus constitute an additional aid to the rigidity of the back, as it does in other species of this family and in many other birds. The centra increase in depth beneath the neural canal the nearer they are to the sacrum. In the first dorsal the body measures about one millimetre, the vertical diameter of the canal being three; in the last dorsal it equals the diameter of the canal. The interarticular facets are in the vertical plane, with their concavities and convexities opposed to each other, as they were described when speaking of the last cervical vertebræ. The bodies are about of a length, constricted at their middles and expanding towards their extremities. The first two dorsals each bear in the median line, beneath, an hypapophysial process of considerable size, affording abundant surface for attachment of some of the muscles of the neck. The process of the first dorsal has one common trunk, with a compressed midprong and two lateral and pointed subprocesses. (See Pl. II, Fig. 5.) The second dorsal possesses a single long hypapophysis, quadrate in form, dipping into the chest further than the first. There is not a trace on the remaining dorsals of this appendix. Parapophysial processes, so prominent in nearly all the cervicals, afford in the dorsal vertebræ simply articulating facets for the capitula of the pleurapophyses situated just within the anterior margin of the neural canal of each centrum, never extending to the vertebræ beyond, forming the demi-facet of andranatomia. Immediately above these facets, on either side, may be noticed a group of pneumatic foramina of various sizes and shapes, and again, anterior to these foramina, the rim of the body of the vertebra for a limited distance becomes sharply concave, being opposite to a like concavity in the next vertebra, the two, when opposed and articulated, forming the oval foramen for the exit of the dorsal nerves. Elliptical articulating facets for the tubercula of the pleurapophyses, looking downwards and outwards, are seen on the inferior ends of the diapophyses, with a midridge running from each facet to the base of the process, to be expanded and lost on the sides of the centra. As there are five dorsal vertebræ, so are there five *pleurapophyses* articulating with them and with the hæmapophyses below. Each rib is attached to a single vertebra, as shown while speaking of the dorsals. The necks of these ribs become more elongated the nearer they are to the pelvic extremity of the body, the first possessing the shortest. This is exactly reversed in regard to the pedicles bearing the tubercula, being the longest in the first pleurapophysis and shortest in the last. This contraction of the pedicles is progressively compensated for by the lengthening of the corresponding and respective diapophyses of the vertebra to which they belong. Viewing the ribs from the front, in the skeleton, the curve they present resembles the quadrant of a shortened ellipse, the vertex of the major axis being situated at the base of the neural spines; viewed laterally, the curve is sigmoidal, though a much elongated and shallow one, with the hæmapophysial extremity looking forwards and the facet of the tubercle backwards. The first rib is the shortest and generally, though not always, the broadest; the last being the longest and most slender, the intermediate ones regularly increasing in length and diminishing in breadth from the first to the last. In form, the ribs of this Owl are flattened from side to side, widest in the upper thirds, narrowest at their middles, and club-shaped at their lower extremities, where they articulate with the sternal ribs by shallow facets. On the inner surfaces we find the necks produced upon the bodies as ridges, running near their anterior margins and becoming lost at about the junction of the upper and middle thirds in the body of the rib. Pneumatic foramina, from two to three in number and of considerable size, are found just within the commissure between neck and tubercle, posteriorly. All the vertebral ribs bear a movably articulated epipleural appendage, each resting in a shallow cavity designed for it upon the posterior borders. They leave the rib at right angles, but soon turn upward with a varying abruptness. The appendage of the first rib is situated lowest of any on its rib, that of the last the highest; the facets of the others are found in the line joining those of the first and last. They all make acute angles with the bodies of the ribs to which each belong, above their points of insertion. The angle made by the last is the least, and it increases to the last. The epipleurals of the leading pleurapophyses are the widest and generally the longest (the one on the second rib in a skeleton of this bird now before me is as wide as the rib at the point from where it starts), the one on the last rib being always the smallest.

Clubbed at their superior extremities, each one overlaps the rib behind it, and in this manner add stability to the thoracic parietes, which is undoubtedly the function these little scale-like bones were intended to fulfil. The *hæmpapohyses* connect the vertebral ribs with the sternum. There are six of them, one articulating with each vertebral rib and having a concave facet to receive it, while the last meets the sacral rib above and articulates with the posterior border of the fifth below. The first one is the shortest and most slender of all; the fifth is the longest. With the exception of the last, their superior ends are enlarged and compressed from side to side, while below their middles they become smaller; then turning upon themselves, suddenly enlarge again, so as to be flattened from before backwards, when each terminates by a transverse articular facet for articulation with the hæmal spine. Quite an interspace exists between their points of contact with the sternum. They all make a gentle curve upwards just before meeting their respective ribs. The hæmapophysis that articulates with the sacral rib is inserted in a long, shallow groove on the posterior border of the sternal rib that articulates with the last dorsal pleurapophysis, but does not meet the sternum—simply terminating in a fine point on the posterior border of the sternal rib mentioned. From before backwards the sternal ribs make a gradually decreasing obtuse angle with the vertebral ribs, while the angle they make with the sternum is a gradually increasing acute from the fifth to the first. On the anterior surfaces of their expanded sternal ends are to be found on each a minute pneumatic foramen or two. The anterior third of the lateral borders of the sternum is the space allotted for the insertion of these bones.

The Burrowing Owl being a bird not possessed of any considerable power of flight, a circumstance arising from the life it was destined to lead, or the necessity of having that flight ever long sustained, we would naturally expect to find, in the course of a study of its anatomy, those characteristic modifications of the various systems which pertain to species of the class in which that gift has always been a secondary consideration. Nor are we disappointed in this expectation, for a single glance at the size of the sternum of this Owl, when compared with the remainder of its skeleton with regard to areas for muscular attachments, reveals to us the disproportion of the surface supplied by that bone for the attachment of the pectorals. That its dimensions are relatively contracted is proved by actual, comparative, and proportional measurements of the bones with other species of its family, individuals of which, at the best, are not noted for their powers of flight as a rule, and consequently the hæmal spine does not present so prominent a feature of the skeleton as it does in other species of the Class *Aves* where vigorous flight is habitual. Life-size figures of this bone, viewed from the three principal positions for the purpose of study and measurement, are offered to the reader in Pl. I and Pl. II, Figs 5 and 6. The concave dorsal aspect of the body is smooth, being traversed in the median line by a very shallow groove that lies immediately over the base of the keel. This groove terminates, within five millimeters of the anterior border, in a little depression, at the bottom of which are discovered pneumatic foramina, two or more in number, leading to the anterior thickened vertical ridge of the carina beneath. Other minute openings for the admission of air into the interior of this bone are seen among some shallow depressions just within the costal borders. The bone does not seem to be as well supplied in this respect as it is in some other Owls. The costal borders supporting the transverse articular facets for articulation with the hæmapophyses occupy about one-third of the entire lateral border on either side anteriorly. At the bases of the majority of the depressions that occur between these facets are found other pneumatic foramina. The anterior border is smooth and rounded, with a median shallow concavity occupying its middle third. At its extremities, laterally, the costal processes arise with a general forward tendency at first, but with their superior moities directed backwards. The costal borders terminate at the posterior borders of these processes, at a higher level than the anterior sternal margin does at their anterior borders. The coracoid grooves are just below the anterior border. They are deep, continuous with each other, having a greater depth behind the manubrium in the median line than observed at any other point. Their general surface is smooth and polished, looking upwards and forwards, and lying principally in the horizontal plane. They melt away into the body of the bone laterally, at points opposite and not far distant from the posterior articulations on the costal borders. The margin that bounds them below is sharp, travels at right angles from the median line at first to a point posterior to the costal processes, then making a little dip downwards, then again curving upwards, disappears gradually with the groove it bounds. That portion of it from the point where it changes its direction to its termination is described by authors as the subcostal ridge. The manubrium, occupying its usual position in the middle line, is comparatively small, quadrate in form, compressed below, slightly notched and flattened above, its posterior surface forming the inner anterior surface of the coracoidal groove. All the borders bounding the posterior parts of the bone are sharp; the lateral one, taken from the apices of the costal processes to their other and lower terminations, are concave. As is the arrangement generally among Owls, the xiphoidal extremity of the sternum is four-notched, two on either side, the outer notches being the deeper. Both have rounded bases, and the processes that separate them are ample and possess rounded extremities. The border upon which the keel ends posteriorly is square, though we have met with specimens in which it was slightly notched in the median line. The body is oblong, and, if we include the xiphoidal processes on either side, has a length half as long again as its width. The ventral and convex surface, like the dorsal, is smooth and presents but two points for examination. The pectoral ridge, faintly marked throughout its extent, originates on each side at a point near the outer borders of the coracoid grooves, running inwards and backwards, and dies away at the base of the keel near its middle. This little ridge denotes the line between the pectoralis major and minor. The keel is moderately well developed, the distance from the base of the manubrium to the carinal angle being equal to the distance from the same point at the base of the manubrium to the base of either costal process or outer anterior sternal angle. It is compressed, smooth, and thin, but its stability is greatly aided by the carinal ridge on either side, which commences strong and well marked at the base of the manubrium, just within the anterior border running parallel with the latter, and disappears as it approaches the carinal angle. The anterior border of the keel is sharp and concave; the inferior border is convex, with the edge slightly thickened. The point of intersection of these two borders anteriorly is rounded and forms the carinal angle. The inferior border expands posteriorly, and the keel terminating a short distance before arriving at the posterior sternal border, the two become blended with the surface of the body of the bone.

Sacral vertebræ; pelvis; and coccygeal vertebræ.—It is no uncommon occurrence to find in the skeletons in many species of birds at least one or more of the anterior sacral vertebræ articulating with a greater or less amount of freedom with one another, but in the sacrum of the Owl now under consideration, with the exception of a few faint lines indicating the original individuality of the vertebræ, the bones are thoroughly anchylosed together and to the ossa innominata. From inspection of this compound bone in immature birds, we find the usual number of sacral vertebræ composing the sacrum to be thirteen. The anterior face of the first possesses all the necessary elements for articulation with the last dorsal. The neural spine has a thickened crest that soon meets the ilia on either side; its anterior edge is thin, and gives attachment below to the interspinous ligament. The neural canal is circular, and the prezygapophyses well marked. The articular facet of the centrum is in the vertical plane, with its curvatures similar to those ascribed to the anterior facet on the centra of the dorsals. The neurapophyses are broad and the diapophyses are strong and raised, with their enlarged extremities expanded upon and firmly united with the iliac bones. There is but one pair of sacral pleurapophyses, and they are free ones. Long and slender, they articulate with the first vertebra in the usual manner, but the relation is much more intimate, as they touch the diapophyses for some little distance beyond the tubercula towards the capitula. The lower extremities of these ribs are terminated by little roundish knobs, which articulate with the hæmapophysis on either side, described as being inserted in the posterior border of the fifth sternal rib. Viewing the bone dorsal-wise, it is to be seen that the thickened crest of the neural spine of the first vertebra protrudes from the angle made by the ilia meeting it anteriorly to a greater or less distance. This broad and compressed crest, then continued backwards, is firmly wedged between the ilia until we pass the third vertebra; at this point the ilia diverge from each other to another point just anterior to the acetabula, then converge, terminating in the posterior sacro-iline border within five or six millimetres of each other. The sacrum completely fills in the lozenge-shaped space thus formed from the third vertebra—first, by continued broadening and compression of the neural spine, that soon becomes one with the neurapophyses; and, secondly, by the expanded extremities of the di- and par-apophyses, the processes themselves also taking due part. The integrity of the surface is unbroken, save posteriorly, where a few pairs of foramina exist among the expanded transverse processes, increasing in size from before backwards. Anterior to a line joining the acetabula this surface is in the horizontal plane; posterior to this line there is a decline, which declination is accepted also by the innominate bones; this gives the entire pelvis a shape that seems to be characteristic of the majority ot both the diurnal and nocturnal *Raptores*. The "ilio-neural" canals here present open by small apertures posteriorly, at about the point where the ilia commences to diverge, passing obliquely downwards and forwards; their anterior openings are large enough to allow a view of their internal walls. The neural spine that divides them throughout is compressed from side to side; the ilia which form their outer boundaries are convex; the neuro-spinal crest forms the roof, the basal surface being deficient, formed merely by the spine-like di- and par-apophyses of the vertebræ and the confluent neural arches. The first vertebra occupies the lowest level, the bird supposed to be standing as in Pl. I. Now, a line drawn mesial on the centra below, from the first centrum to the last, gradually rises until opposite the anterior borders of the ischiadic foramina, then curves rather abruptly downwards to its termination. The centra of the first two or three vertebræ are compressed from side to side to such an extent as to cause them to appear wedge-shaped, the common apex or edge being below; after that, however, they rapidly broaden, become compressed vertically and more cellular in structure; they are very broad from the fourth to the ninth, inclusive—then as rapidly become contracted as they approach the coccyx. Minute but numerous pneumatic foramina are seen at or near the usual localities. The largest foramina for the exit of the roots of any pair of sacral nerves is generally in the fifth vertebra; they decrease in size as they leave them either way. In the young only the last few of these foramina are *double;* they are all double in the adult and placed one above another, a pair on the side of each centrum at their posterior borders, for the exit of the roots of the sacral nerves. The diapophyses of the anterior five sacral vertebræ are thrown out against the internal surfaces of the ilia, to which they are firmly attached, and act as braces to hold the engaged bones together. The parapophyses of the first form facets for articulation with the sacral ribs; the second and third have none; in the fourth and fifth they also act as braces in the manner above described, joining the ilia just before their divergence commences. Reliance seems to have been placed entirely in the completeness of the sacro-iliac union in the last vertebræ, for the apophysial struts terminate in that portion of the pelvic vault formed by the sacrum itself, except in the last two vertebræ, where the parapophyses abut against the iliac borders. The parapophyses of that vertebra which is opposite the acetabula are prominent, they being long and ample, reaching to the border and reënforcing that part of the pelvis that requires it the most, the vicinity of the leverage for the pelvic limbs. In other *Strigidæ* several apophyses are thrown out at this point. The posterior opening of the neural canal in the last sacral vertebra is subcircular, its diameters being about a millimetre in length. This vertebra also possesses small postzygapophyses, looking upwards and outwards for articulation with the prezygapophyses of the first coccygeal vertebra; the articulating facet of the centrum is also small, long transversely, notched in the median line, the surface on either side being convex. At every point where the sacrum meets the iliac bones union is firm and complete, though both upon the internal and external surfaces the sutural traces are permanently apparent. The anterior iliac margins, as they diverge from the sacral spine, form an acute angle, concave forwards; they have a well-marked rim or border, nearly a millimetre in width, raised above the general surface of the bone, which disappears on the outer borders as we follow them backwards. The two anterior and outer angles overhang the sacral and fifth or last dorsal pleurapophyses. From these last the marginal boundaries, which necessarily give the bones their form, are produced backwards and outwards to a point opposite the centrum of the third sacral vertebra, then backwards and inwards, forming at the above points two lateral angles. From the apices of the two lateral angles to where the borders terminate on either side in front of the acetabula with the pubic bones, the direction is such as to form a concavity on each side; the line joining the bases of these concavities, points opposite the posterior openings of the ilio-neural canals, being the narrowest part of the pelvis. The upper and at the same time the inner margins of the bones in question, from the anterior and median angle, at first approach, soon to diverge from each other, and form the gluteal ridges and borders of those scale-like projections of the posterior portion of the ilia that overhang the acetabula. Produced now as the "gluteal ridges", they tend almost directly backwards, though very slightly inwards, to terminate in the ischial margins. The preacetabula dorsal iliac surfaces are generally concave, while the postacetabula, and at the same time that surface which occupies the higher plane, is flat, having a slope downwards and backwards, with a ventral reduplication after forming the rounded and concave posterior boundary of the pelvis. The preacetabula superficial iliac area is nearly double the extent of the postacetabula. The antitrochanterian facets that surmount the cotyloid cavities have the usual backward direction, though their surfaces look downwards, outwards, and a little forwards. The external surfaces of the *ischia* look upwards and outwards, having just the reverse direction ventrally. Posteriorly, these bones are produced beyond the ilia into finely pointed extremities, tending to approach each other. The slender pubic bones, after closing in the obdurator foramen on either side, touch and unite with the inferior borders of the *ischia* as far as the pointed ends of the latter, beyond which they are produced nearly to meet behind. The interval between the free extremities of the pubic bones in some individuals, notably "birds of the year", is very slight, less than a millimetre sometimes, approaching a closed pelvis. The circular and thoroughly perforated acetabula are formed in the usual manner by the three pelvic bones. They have a diameter of about three millimetres, and their circumferences are in the vertical plane. The ischiadic foramina are elliptical and large; they are, as usual, posterior to the acetabula and above the obdurator foramina. These last are also elliptical, and about one-third the size of the others. Should the major axes of these two ellipses be produced backwards, they would intersect and form an acute angle just within the posterior pelvic border. Viewing the pelvis ventralwise, we observe, in addition to points mentioned when speaking of the sacrum, the reduplication of the ilia, forming pockets behind and internally, that open outwards through the ischiadic foramina and inwards into the general pelvic cavity. The pelvic passage is subcircular, unclosed, with an average diameter of 1.7 centimetres vertically, and a little less transversely. The narrowest part of the pelvis measures 1.2 centimetres, the widest 2 centimetres, being taken between the iliac projections over the acetabula; the average length, including anterior neural spine, is 3 centimetres. Pneumatic foramina occur in the shallow anfractuosities, between the antitrochanters and gluteal ridges in the ilia. None of the *caudal vertebræ* are grasped by the pelvis, the posterior extremity of the sacrum always assisting to form the curve of the pelvic passage. The usual number of these vertebræ is seven, though occasionally an additional one is found, making eight in some individuals. This enumeration does not include the modified and ultimate coccygeal vertebra, the pygostyle. They are all freely movable upon one another, and the first upon the last sacral vertebra. The articular facets upon the centra vary in shape throughout the series; that upon the first is long transversely, with a double convexity so arranged as to accommodate itself to the one on the extremity of the sacrum; they soon become uniform, to pass to the subcircular one existing between the last vertebra and the pygostyle, on which it is concave.

The pleurapophyses and parapophyses are very rudimentary or entirely suppressed. Each vertebra bears a prominent neural spine, which, from the first to the sixth, inclusive, is bifurcated; in the last two it appears as a mere primitive knobule. The transverse processes are all deflected downwards and outwards, very small in the first and still more so in the last; are largest in the fifth and sixth. Prezygapophyses are well marked; they reach forwards and articulate with the feebly developed postzygapophyses. In a few of the posterior segments there appears to be an effort on the part of the neurapophyses to overlap the vertebra next beyond them. The neural canal is pervious throughout, commencing in the first with a calibre equal to that in the end of the sacrum; it gradually diminishes, and terminates in a minute, blind, conical socket in the pygostyle. Hypapophyses are produced downwards in a few of the ultimate vertebræ. They hook forwards and articulate with the centrum of the vertebra next beyond them. Sometimes they are observed to be free, or rather resting upon a facette on the anterior margin of one centrum and extending over to the anterior margin of the centrum of the vertebra anterior to it, to meet a similar facette, as a tiny styliform process. The spinal column is completed posteriorly by the pygostyle—that ploughshare-shaped segment that articulates with the last coccygeal vertebra. Above its cup-shaped facet this bone arises as a laterally compressed plate, extending backwards and bifurcated at its extremity, as if to imitate the neural spines of the vertebræ of the series of which it is an ultimate appendage. Below the facet it projects forwards and completes the median sequence of hypapophyses of the centra, being rather larger than any of them. The posterior curve is simply inflected downwards and forwards from its apex.

The scapular arch—(See Pl. I).*—The three elements that constitute this arch are all represented and independent bones; the coracoids articulate with the sternum and scapulæ; coracoids and clavicle, connected by ligaments, lend their share to form or strengthen the shoulder-joints. The coracoid, comparatively large and strong, forms in the usual manner an arthrodial joint of restricted movement with the sternum, its lower end being in the coracoid groove on the anterior part of that bone. The inner angle of its base is about 2 millimetres from the mesial line, and 4 millimetres intervening between it and its fellow of the opposite side in the groove. This extremity is broad, its outer angle being beneath the third sternal rib at its point of meeting the costal border; it is compressed from before backwards. The articular facet, looking downwards, backwards, and a little inwards, is transversely concave, with a slight dividing ridge, running antero-posteriorly, converting the general concavity into two smaller ones. The coracoid when in position is produced upwards, forwards, and outwards, making, with the vertical line through its base, rather an acute angle. A limited portion of the middle third of the bone only is subelliptical on section and at all shaft-like, due to the fact that the coracoid in this bird being perhaps less than the average length as compared with the size of the bird, and, secondly, to the unusually enlarged extremities, features observable, more or less, in *Raptores* generally. The anterior groove of the upper extremity, that is arched over by the head of the clavicle above, is deep, and occupies fully the upper third of the bone. The coraco-clavicular process springs, thin and compressed, from the inner side of the shaft of the bone, at junction of upper and middle thirds, to turn upon itself, so as to be projected upwards, forwards, and a little outwards, terminating with an elliptical facet for articulation with the clavicle. The upper border of this process is concave lengthwise and articulates throughout its extent with the inferior margin of the acromial process of the scapula. The lower and thin edge of the coraco-clavicular process tends obliquely downwards, to be lost on the inner surface of the shaft of the bone near its middle. The outer wall of the anterior groove is formed by the coracoid itself, the process just described being really nothing more than a wing-like extension forming the inner boundary of the groove in this bird; it terminates above both clavicle and scapula in a rounded, tuberous head. Below this head, anteriorly and still more inwardly, the coracoid affords a vertical, elongated facet for the clavicle, while behind, looking a little outward, is the concave elliptical facet that constitutes about one-third of the glenoid cavity for the humerus, internal to which, and running first directly upwards, then making a right angle and continuing forwards, a little upwards, and outwards, the last direction being the upper margin of the coraco-clavicular process, is another facet, for the scapula. Behind and below, this bone displays one or two lines and depressions, boundaries of muscular attachments. In the middle of the anterior groove, opposite the base of the coraco-clavicular process, the shaft of the bone is perforated; this perforation is elliptical lengthwise with the shaft, and passes directly through to make its appearance on the posterior convex surface just below the scapula. This foramen transmits a branch of that cervical nerve coming from between the twelfth and thirteenth cervical vertebræ. This nerve branch, after passing through the bone, is distributed to the under surface of the pectoralis minor muscle, and its filaments ascend among its fibres. This foramen is observable also in other Owls, as *Bubo virginianus*, and in some of the diurnal *Raptores*, as in *Accipiter cooperi;* in very many birds it is absent. The *scapula* presents little that is unusual in that bone among the class generally. It lends the additional two-thirds of articular surface to form the glenoid cavity with the coracoid; internal to this the acromion process extends forwards, touching the coracoid as described, and having a limited bearing on the clavicle. Posteriorly its blade-like length is produced, expanding, turning slightly outwards to terminate in an obliquely truncate extremity, with its point over the second dorso-pleurapophysial interspace.

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*It will be seen that in this figure, corresponding limbs, and other parts that are alike on either side of the body, have not been reproduced, it being thought the better way, as the bones on the side towards the observer would necessarily obscure the more remote one, complicate the figure, and show nothing additional.

What the scapula lacks in interest is amply made up by the changes observed in the last bone of the group, the clavicle. This element is broad above, much compressed from side to side throughout; it spans the anterior groove of the coracoid and touches the scapula as described above, rapidly diminishing in size as it is produced downwards and inwards by a gentle curve towards the fellow of the opposite side. The upper extremities in adult birds are separated by an average distance of 2.3 centimetres. If the sternum pointed to feebleness of flight in this little Owl, it is still further carried out by the ill-developed clavicles, which constitute that arch in birds, where they are thoroughly and firmly united below, that assists to resist the pressure of the humeri when the wings are depressed in flight, and send them back to their former position after the completion of the action. In examining again Pl. I, which represents the skeleton of an old male, we find this bone to be simply a pointed styliform process; in other individuals, and adults too, it does not even attain the length here shown; but, as if to bid defiance to all law or invariable rule governing it, we again find in very young birds cases where it becomes confluent with its fellow, forming a broad U-shaped arch, though never a very strong one. In a case of this kind the bone was finely cancellous throughout, with an extremely attenuated layer, scarcely covering it outside, of compact tissue. In Pl. I, and other individuals like it, the clavicles were pneumatic. Again, in both young and old, it may have any of its lower parts completed by cartilage, or unite with the manubrium by means of the same material; it never displays a mesial expansion of bone at the point of confluence. As already shown, the superior entrance of the anterior groove on the coracoid is a complete circuit, formed by the three bones of the group. The head of the coracoid overhangs it above; next below is the clavicle, closing it in anteriorly; lowest of all the scapula behind. A plane passed through the superior margins of this aperture would look upwards, inwards, and backwards. All the bones of the scapular arch are pneumatic, with the exception sometimes seen in the clavicle, and the foramina, to allow the air to enter their interiors, look into the enclosed groove of the coracoid just described. In the scapula the foramen is usually single and in the acromion process, single again in the clavicle; it is seen in the broadest part of the head, while in the coracoid there is generally a group of these little apertures, situated in the depression on the surface that overhangs this entrance to the coracoidal groove.

Of the upper extremity.—The upper extremity consists of ten distinct bones in the full-grown bird, omitting minute sesamoids that might exist. These are the humerus of the arm, the radius and ulna of the forearm, two free carpals, the metacarpal, and four phalanges. (See Pl. I.) The ***humerus*** is a long, extremely light, and smooth bone, and when viewed from above in its position of rest, with the wing closed, it reminds one of the curve in the small italic letter *f*, being concave above towards the scapula; and this bone is so twisted that this same curve is exhibited, though not quite as well marked, when viewing it laterally. The humerus is 5.5 centimetres long, subcylindrical on section at mid-shaft, at which point a minute aperture exists for the passage of the nutrient vessels that are distributed to the osseous tissue and its internal lining. This foramen enters the bone very obliquely, its external orifice being the nearest the proximate extremity. This end is well expanded and surmounted above by a strongly developed radial crest that overhangs the shaft slightly towards the palmar aspect. It occupies a line on the bone from the articular facet for the shoulder-joint to an extent shown in Pl. I. The ulnar crest, or lesser tuberosity, encloses quite an extensive fossa below, which acts also as a partial screen to the pneumatic foramina, for the humerus is highly pneumatic. They usually consist of one circular opening, surrounded by a group of many smaller ones. In young birds a very large foramen is generally present; this closes in as age advances. Between the two tuberosities is the vertical and elliptical convex facet for articulation with the glenoid cavity of the shoulder-joint, constituting the "head of the humerus". The radial crest displays palmad, a ridge for the insertion of the tendon of the pectoralis major. The distal end of the humerus is also expanded in the vertical plane and gently convex anconad, the reverse condition of the proximal extremity. It presents, for examination, the articular facets for the ginglymoid joint it forms with radius and ulna, and the superior and inferior condyles. The larger, and at the same time the superior, of these two facets is intended for the cup-shaped depression in the head of the radius, as well as a portion of the articular surface on the ulna. It is ovoid in form and placed obliquely on the bone, the inferior end of the long axis of the oval being situated the nearer the proximal extremity of the shaft. This facet is separated from the trochlea surface for the ulna by a well-marked depression; this latter is a knob-like tubercle when compared with the radial facet. The condyles and the entire articular surface are about in the same plane posteriorly; that is, neither increases the length of the bone, one more than another. Passing from the trochlea surface for the ulna towards the inner aspect of the shaft, there is to be observed a shallow depression, which corresponds to the olecranon fossa of human osteology, and in full extension of the limb allows room for that process of the ulna in this bird. The ***radius*** has an average length of 6.6 centimetres, and the ***ulna*** a corresponding length of 6.8 centimetres, so that their distal extremities, when articulated, as we ex amine them in the closed wing, extend beyond the head of the humerus. In this position also the radius occupies a higher level than the ulna, and is the innermost bone of the two. The radius is slender, the transverse diameters of its subcylindrical shaft varying but little throughout its extent, though its extremities are expanded. From the elbow-joint, when the two bones are in position, it at first diverges from the ulna at a moderate curve, to approach that bone again to nearly absolute contact at the junction of middle and distal thirds, by a more gentle curve; from this latter point it lies parallel with the ulna to the wrist. The head of the radius is elliptical, being crowned by a depression for articulation with the oblique facet on the distal end of the humerus. Beyond, below, and to the outer aspect of this facet is another of similar form, though convex for articulation with the ulna, while still more advanced toward the distal end we find the bicipital tuberosity, and, beyond, the minute nutrient foramen; all of the bones beyond the humerus being non-pneumatic. The distal extremity of the bone in question is terminated by a little fan-like expansion that caps the ulna and articulates by its anterior convex margin with the scapho-lunar of the wrist. It is marked above by the longitudinal groove for the tendon of the extensor metacarpi radialis longus. The shaft of the ulna is nearly three times as large as that of the radius. Its outer half is straight, its inner curved towards the humerus, thereby increasing, at the proximal moiety, the interosseous space, by the assistance of the opposite curve made by the radius. The stronger end is the one involved in the formation of the elbow-joint; here is to be observed the depression for the head of the radius, or the lesser sigmoid cavity, while the articular surface beyond that occupies the entire end of the bone, directed downwards, inwards, and backwards, presents for examination the greater sigmoid cavity, the olecranon and coranoid processes, and the cavity for articulation with the oblique facet of the humerus. The greater sigmoid cavity is subcircular and of some depth; its lower and produced lip represents the coranoid process, as does its upper, better marked, and more tuberous prolongation represent the olecranon of andranatomia. Extending radiad is another concave, quadrate, articular facet for the oblique tubercle of the humerus, as the first-mentioned concavity articulates with the ulnar tubercle or trochlea. A little beyond this articular surface are various small tuberosities and depressions for the origin and insertion of muscles. Approaching the wrist, the shaft is seen to be generally smooth, and diminishes in calibre at junction of middle and proximal thirds in the nutrient foramen, while along its entire length, at certain intervals, are the slight elevations for the apices of the quills of the secondaries. The distal extremity of the ulna enters into the formation of the wrist-joint; it is not nearly as large as the proximal end. The articulating surface has a deep mesial cleft in the vertical direction, limited externally by an elliptical curve, internally by a double, tuberous knob for articulation with the irregularly formed cuneiform of the carpus, while above is a roughened surface that is covered by the expanded end of the radius.

The *carpus* is composed of the *scapho-lunar*, *os magnum*, and *cuneiform*. The scapho-lunar articulates with radius, os magnum, and ulna. The radial articulation is a rather deep and elliptical concave facet, its lower border gliding over the ulna, while the distal end of the radius plays in the concavity. The opposite face of this six-sided little bone is also smooth, and is a nearly flattened surface that articulates with os magnum. The upper and lower surfaces, as well as the ends, are simply roughened and fashioned to give the proper form to that part of the joint into which it enters, and for the attachment of ligaments. *Os magnum* has become confluent with the mid-metacarpal, forming its trochlear surface for articulation with scapho-lunar, cuneiform, and ulna. The *cuneiform* is an extremely irregularly shaped bone; it appears to be rather the larger of the two free carpals, and is the lower in regard to position. It articulates with ulna and os magnum, simply. Its outer ulnar facet is elliptical and shallow, monopolizing the entire face of the bone; its inner facet is very irregular, being formed so as to accommodate itself to the ulnar tubercles, with which it articulates. Projecting towards the metacarpus, this little bone has two prongs or limbs, the inner aspect of the extremities of each possessing a subcircular facette that articulates, the outer and shorter limb with the internal trochlear margin of os magnum, on the same side; the inner and longer limb straddles the metacarpal and glides over a surface, during movements of the joint, at a point about where magnum becomess confluent with mid-metacarpal. The cuneiform has also attached to it ligaments that enclose the wrist-joint beneath—capsular ligaments of the carpus.

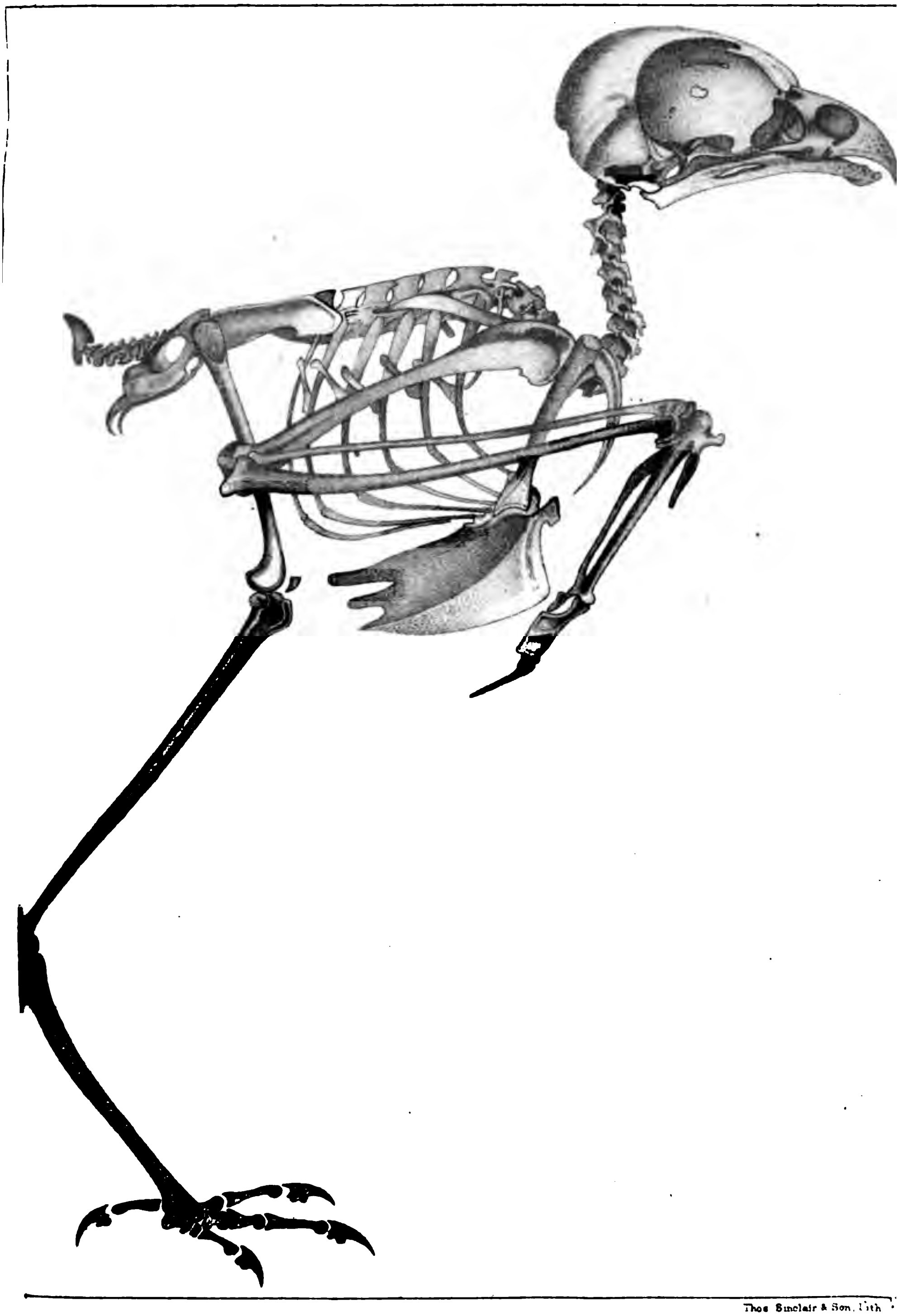
The *metacarpus* is formed in the usual manner, by the amalgamation of the index, medius, and annularis metacarpals, the first, second, and third, respectively. It is 3.3 centimetres long, articulating with scapholunar, ulna, and cuneiform at its proximal extremity by means of os magnum, that has become anchylosed with mid-metacarpal and the phalanges at its distal end. The first metacarpal is short, and fused with the second just anterior to the boundary of the trochlear surface of os magnum; it makes an angle with the shaft of the second metacarpal, its extremity being directed upwards. At its base, close to the shaft of mid-metacarpal, it bears a uniform facette for articulation with the index phalanx, a free, three-sided, pointed little bone, about 9 millimetres in length. The second metacarpal is straight; its enlarged proximal extremity is formed chiefly by the cönfluent os magnum; its shaft is inclined to be subtrihedral, with its broadest face looking forwards; its distal extremity is terminated by a knot-shaped enlargement, that is still further enhanced by the confluence with the third metacarpal. It bears a digit composed of two phalanges, the proximal one bearing on its posterior border, for nearly its entire length, a quadrangular expansion, that has a raised margin, leaving a single concavity radiad; a similar concavity occurs on the ulnar side, but is there divided by a ridge, sloping downward into two shallow depressions. This little bone somewhat reminds one of a cleaver, with the end of its handle attached to the metacarpus. It supports at its distal extremity the second phalanx of this digit, a bone having very much the same appearance and shape as the index digit, only being longer and more pointed. The proximal ends of all the phalangeal segments are more or less expanded, in order to support the ample facets of articulation that occur among them, and the metacarpus. The third metacarpal is expanded transversely above, slender below, where it falls a little beyond the medius after its confluence with it. It also has a small, pointed phalanx, freely attached to its distal extremity, and lying in that recess formed by the shaft and posterior expansion of the first phalanx of the second digit. At a very early date, comparatively, in the life of this Owl, ossification is normally extended to many of the tendons of important muscles of the antibrachium and pinion.

Of the pelvic limb.—The lower extremity is composed of twenty distinct segments, including the patella, or just double the number found in the pectoral limb. This increase will not surprise us when we recollect the greater number of small bones devoted to the foot above those found in the hand. Its most striking feature, next to those osteological characteristics common to the family, is its extreme length, due principally to the tibia and tarso-metatarsus. All the bones of the lower limb in this species are non-pneumatic. The *femur* is comparatively of good size and strong; articulated in the usual manner, it measures 4 centimetres in length and 7 millimetres across the condyles at their widest part. At the proximal extremity, externally, above the shaft, there is a flat and roughened surface, bounded above by the curved trochanterian ridge. This surface forms the major part of the great trochanter. There is no trochanter minor present. The trochanterian ridge is the highest part of the bone, when it is held vertically; it lies in the antero-posterior plane, with the femur in its natural position, the bird standing erect; from it, sloping directly inwards and occupying the remainder of the summit between it and the head, is a smooth articular facet, broadest externally, merging into the globular head internally. With the head it constitutes the articular surface for the pelvis—it being opposed to the antitrochanterian facet of the ilium, while the caput femoris plays in the cotyloid ring. The excavation for the ligamentum teres on the latter is conical and deep, consuming a good part of the bone; it is situated on its upper and inner aspect. In looking into the relation existing among head, neck, and shaft of the femur of this bird, we must observe that if the straight line lying in the middle of the surface of the internal aspect of the shaft were produced upwards, it would pass through the centre of the facet at the summit—if anything, nearer the trochanterian ridge than it does to the head. This facet also is notably narrower just before arriving at the head than at any other point. Again, the plane passing through the external and circular boundary of the head makes an angle of a good 45° with this line, so that with these facts in view we can hardly assert in the case of the species before us, as do some authors on comparative anatomy in describing this bone *in general*, that the axis of the head of the femur is either nearly at right angles with or is sessile with the shaft. It would appear, though, that it has quite as much of a neck to boast of as the anatomical neck of humerus or the neck of the scapula in works on human anatomy. The shaft throughout its length, until it begins to approach the distal condyles, where it is subcompressed and expanded antero-posteriorly, is nearly cylindrical, bent slightly backwards at its lower end, and offers for examination merely the intermuscular ridges, with the linea aspera, feebly marked, and the nutrient foramen, all of which maintain their usual positions on the bone. At the distal extremity the rotular canal, the intercondyloid notch, and the popliteal fossa are all strongly produced, giving due prominence to the condyles, internal and external, between which they form the dividing tract. The external and lower condyle is divided in two by a vertical excavation, deepest above. Of the two facets thus formed, the inner articulates with the tibia, the outer with the head of the fibula. The external surface of this condyle is flat and continuous with the shaft. The inner condyle, broad posteriorly, has a slight depression in the surface that bounds it on the tibial side, and as a rule the usual sites for ligamentous attachments about this extremity are at best but feebly represented. The *patella*, encased in the tendon of the quadriceps femoris, is situated about 3 millimetres above the rotular crest of the tibia, anteriorly, having the form of an oblate hemispheroid with its base directed upwards, the long diameter of which measures 3.5 millimetres. The *tibia* is the longest bone in this bird's skeleton, and at the same time, taking this length into consideration, the least curved or bent along the shaft; it has, however, a slight and just appreciable gradual curvature forwards that is most apparent about the junction of middle and upper thirds. Its average length, measured on the inside, is 6.7 centimetres; its extremities being expanded for articulation, above with the fermur, below with the tarso-metatarsus. These expansions are of about equal dimensions, though differing vastly in form, in this respect being unlike some of the diurnal *Raptores*, in which the distal condyles constitute the smaller end of the bone.

Among the most important points presented for examination about the head is the articular surface that crowns it above for the condyles of the femur. This is subquadrate in form, uneven, highest at the inner and anterior angle, sloping gradually to the opposite one, bounded almost entirely around by a raised margin, that is most feebly developed posteriorly, and at a point anterior to the head of the fibula, where it is absent. In front this border may be nominated the rotular or epicnemial ridge, though it is no more prominent there than at any other point, but in many birds it is so produced as to produce a process of some size, to which these terms are applied. Externally and posteriorly the margin is roughened for the attachment of ligaments that bind the head of the diminutive fibula to this bone. In the middle of this articular surface is to be seen a tuberosity, on either side of which are the depressions for the femoral condyles. Produced downwards, anteriorly from the rotular ridge are the cnemial ridges; these have their crests bent slightly outwards, and they merge into the shaft below, abreast the superior point of the fibular ridge. Of the two, the outer or ecto-cnemial is the shorter; that is, it does not extend so far down the shaft as the inner or pro-cnemial. They have between them an ovate concavity, with the larger end above, the lower end subsiding upon the shaft with the ridges themselves. The vertical elevation on the external aspect of the shaft for articulation with the fibula runs down the side but a short distance; a little below its abrupt termination may be observed, in a line with it, the nutrient foramen, entering very obliquely from above downwards. After leaving the fibular ridge as far as the point where the bone begins to expand transversely at the distal extremity, the shaft is remarkably smooth and nearly cylindrical. This transverse and distal expansion is checked, both anteriorly and posteriorly, by abruptly meeting the distal condyles, the point of meeting perhaps being rather the higher behind. The condyles, differing but little in size, are singularly uniform as to shape, with their curved surfaces downwards, being flat on their outer aspects, with a raised rim bounding them in each case. They stand out prominent and apart. Anteriorly their convex surfaces are the widest, behind they slightly approach each other, and the articular convex surface is narrowest on the outer condyle. The intercondyloid notch is deep, and appears equally well marked throughout its extent. Immediately above it, anteriorly, there is a deep triangular depression; another, and more shallow one, is found behind in the corresponding locality. Up the shaft a short distance on the inner side, anteriorly, is a little tubercle, to which is attached the ligament that binds down some of the strong tendons of the extensors. This ligament crosses the anterior triangular depression mentioned above, obliquely, to be inserted near the external condyle superiorly. This is the arrangement also in *Bubo virginianus*, but in some of the Hawks this ligamentous bridge has become thoroughly ossified, forming a strong bony band across the concavity in question. It is interesting to remark here, however general the rule may be as applying to the diurnal and nocturnal *Raptores*, that whereas this band is ligamentous in the tibia in some of the Owls, a bony one fulfilling the same function is found in them just below the head of the tarso-metatarsus; these conditions are just reversed among some of the Hawks. Usually, in old birds of this species, the *fibula* is firmly anchylosed to the entire length of the fibular ridge of the tibia; arching outwards, its head, surmounted by an antero-posteriorly elongated facet, rises a little above that bone at the point where it is attached to it by ligament. This is the larger part of the shaft in regard to size. Below the ridge this bone becomes simply a delicate little spine, that merges into the shaft of the tibia at about the junction of middle and distal thirds, though it may be traced after this as far as the middle of the outer condyle, where it terminates by a minute tubercle. The head is notched externally, near the centre, and has lodged at that point a small sesamoid that is in the lateral ligament of the knee-joint. Posteriorly on the shaft, about midway down the superior tibio-fibular anchylosis, we observe a small tubercle for the insertion of the tendon of the biceps. The long segment that exists between the tibia and the phalanges of the pelvic limb is the bone *tarso-metatarsus*, or the confluent metatarsals of the second, third, and fourth toes with certain tarsal bones at its proximal extremity. It measures down the anterior aspect, mesially, 4.6 centimetres, and has its extremities enlarged for articular purposes, in common with other long bones of the skeleton. At its proximal end the bone presents superiorly two concave articular surfaces for the condyles of the tibia. They appear nearly on a level with each other, the bone being held vertically. The inner and larger of the two is elliptical in outline, antero-posteriorly; the outer and smaller is fashioned off behind by a tuberous process, directed upwards and outwards. Between these two surfaces arises a prominent tuberosity, that in the articulated limb enters the intercondyloid notch of the tibia quite accurately, and is intended for ligamentous attachment. Anteriorly and internally a groove exists that runs down the shaft, to disappear a little above its middle. This canal is deepest immediately below the articular expansion, and is here bridged over by a little arch of bone, a millimetre in width, that serves to bind down and hold in its proper place the tendon of the long extensor of the toes. Posteriorly there is a much deeper and longer tendinal canal, that extends the entire length of the shaft, being shallowest at the middle and most capacious at the proximal extremity; this is bounded over and internally for a short distance below the head of the bone by the calcaneal process, a thin lamina of bone that has a foramen near its base; this process is surmounted by an elliptical and compressed tuberosity, placed vertically. The opposite wall, above, of this groove is also thin, and extends, in common with the calcaneal process, directly backwards. There are two other foramina seen at this end of the tarso-metatarsus; one just at the external termination of the bony bridge mentioned above, and the other outside and a little above it. Their posterior openings are immediately behind the anterior ones, or, in other words, they do not pierce the shaft in any way obliquely. The shaft of this bone is notably square on section for the major part of its extent, being encroached upon, however, both before and behind, by the aforesaid tendinal grooves. The tendons, especially those that occupy the posterior canal, are very prone to ossification, forming quite sizable bones in the adult, the largest of these being equal to the fibula in bulk, exclusive of course of the head of that bone, and not being as long. Returning to the tarso-metatarsus, we find at its distal extremity, for examination, the trochleæ that articulate with the rear segment of all the toes except hallux. Viewing this end with the bases of these trochleæ towards one, we find the general outline made by them to be truly crescentic, with the horns having a tendency to approach each other behind. The outer trochlea is the highest and longest from before backwards; the other two are about on the same level, the inner one having a posterior and internal process, while the middle one is possessed of a median cleft traversing its face antero-posteriorly. They are sharply divided from each other by narrow slits, that extend up as far as the articulating part, and are continued on the anterior aspect of the shaft for a short way as delicate groovelets. A foramen is situated in the outer of these, that gives passage to the anterior tibial artery, and is comparatively larger than usually seen in the Owls. Behind, the tendinal groove expands, and is bounded distally by the concave border formed by the trochleæ. Upon its internal margin, just above the extremity of the bone, it shows an elongated but feebly marked depression of about 3 millimetres in length. This facet articulates with the os metatarsale accessorium, which is joined to the bone by ligament. This little bone in this bird has an average length of 4 millimetres. It is twisted upon itself, and bears upon one border a convex, smooth surface for the tarso-metatarsus, while distally it has an articulating surface, resembling more the mid-trochlea than any other, for the proximal segment of the hallux. Above it is sharply grooved for the tendon that goes to that toe. The *toes* are four in number, and their bony segments follow the rule that governs the greater part of the class *Aves*; that is, first, second, third, and fourth toes have 2, 3, 4, and 5 phalanges allotted to them, respectively. The first phalanx of the hind toe is more compressed from side to side than in the other toes, possessing more of the characteristics of the second joints. Its posterior facet, that articulates with the accessory metatarsal, fits accurately into the cleft surface seen on that little bone. Anteriorly the facet has a median groove, forming two vertical convexities for the double concave facet on the claw, with its dividing ridge. The claws are all a good deal alike, varying in size, the rear one being the most compressed laterally. They are pointed, arched, and nearly conical, the horny thecæ that cover them during life only being grooved on the under side. Their proximal ends have an articulating facet for the next phalanx behind them; this is so arranged that they can be more smartly flexed than any of the other joints of the foot, due to the convex articulating surface extending well beneath on the phalanx they meet. On the under sides of their proximal extremities is a tuberosity for the attachment of the flexor tendons; it has on either side, below, an oval foramen to allow vessels and a nervelet to pass to the extremities of these ungual phalanges. The first joint of the second toe, and the first and second of the third, are thickset and short, articulating internally with the tarso-metatarsus, and having their facets so arranged as to allow of motion only in the one plane. These bones may almost be said to interlock with each other, with their superior projecting processes behind fitting closely into the deep groove intended to receive them on the anterior faces of the joints to their immediate rear. The other undescribed phalanges of these two toes resemble the proximal segment of hallux. The fourth or outside toe possesses five phalanges, but the three innermost segments are very short, and are really nothing more than one of the middle type of phalangeal bones, such as the third on the mid-toe, divided into three nearly equal parts, the proximal and distal pieces retaining all the characteristics of that bone, while the middle segment is simply a mid-section of the shaft. This arrangement, however, together with the manner in which the proximal phalanx, if it may be termed so in this bird, articulates with the long and elevated trochlea on the tarso-metatarsus, gives this toe a versatility and a power to be thrown outward and, to a limited extent, to the rear, not enjoyed by any of the other toes, constituting one of the most interesting anatomical features that we find in the family *Strigidæ*.

PLATE I.

The skeleton of *Speotyto cunicularia hypogæa.*



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SKELETON OF SPEOTYTO CUNICULARIA VAR. HYPOGÆA.

PLATE II.

The skull, sternum, pelvis, etc., natural size.

Fig. 1. The skull from above.

Fig. 2. The skull from below.

Fig. 3. The mandible from above.

Fig. 4. The pelvis from below.

Fig. 5. Transverse section of thorax, showing a dorsal vertebra, with the corresponding pair of ribs and corresponding section of the sternum.

Fig. 6. The sternum from below.

Fig 1

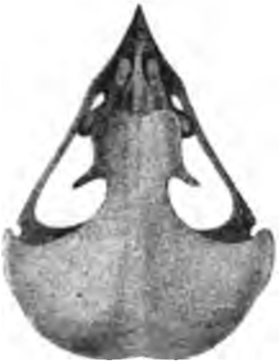


Fig 2

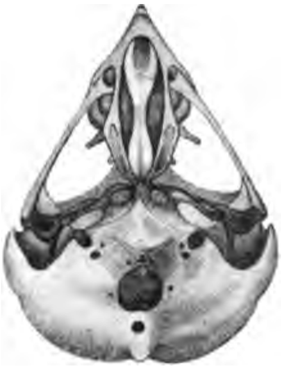


Fig 3

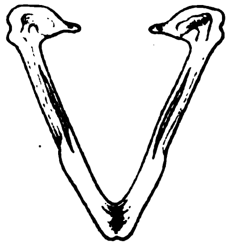


Fig 4

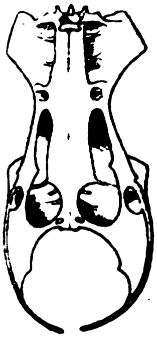


Fig 5

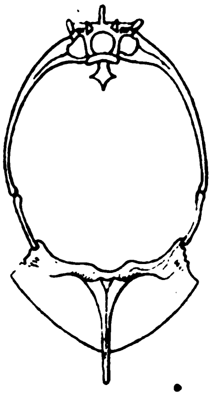
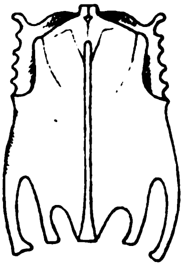


Fig 6



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OSTEOLOGY OF SPEOTYTO CUNICULARIA VAR. HYPOGÆA.

Art. V.—Osteology of Eremophila alpestris.

By R. W. Shufeldt, Acting Assistant Surgeon United States Army.

The 11th of March, 1880, was a particularly severe day at Fort Fetterman.* A violent wind and snow storm prevailed during the entire twenty-four hours. In the creek bottom, below the fort, where the wind had exposed the ground of some land that had been used for gardening purposes the year before, thousands of Horned Larks congregated. They seemed disinclined to vacate their partially sheltered position, preferring to face the few death-dealing fires I delivered them rather than be tossed over the prairie by the freezing storm. At each shot, the flocks arose, skimmed low over the ground, soon to alight again. These simple manœuvres afforded me abundant opportunity to secure many specimens, and several hundred were taken. As they afterwards lay upon the table in my study, one would almost have said, before submitting them to careful scrutiny and examination, that not only was true *alpestris* represented, but both the varieties, *leucolæma* and *chrysolæma*, described by modern writers. Certainly it was that there were many shades of their normal coloring among them, accompanied by differences in size that were not due to sex. I feel sure my reader will pardon the liberty I take in adding to an article upon the osteology of this interesting bird a life-size portrait of it, selected from the large number before me on the occasion referred to. The hind claw in this individual (Pl. IV, Fig. 22) was longer and straighter than any of the others examined by me, but this member, as well as the areas of the different colors of its plumage, are, in my representation, the results of careful measurements and comparison. I have never seen the black pectoral crescent of this bird in the low position in which Audubon represents it in his work (B. Am., VIII, No. 100, Pl. 497), where he figures his *Alauda rufa*, the Western Shore Lark. The bird figured in my plate was taken in that section of our country where the variety *leucolæma* is usually found breeding during the season, and probably belongs to series described as such, but certainly has attained a style and brilliancy of coloring that brings it very near to true *alpestris*, its size excluding it from the variety *chrysolæma*. Interesting and important as this part of the subject is in the life history of this bird, we must, with these few remarks, allow it to rest here and proceed with the true object of this paper, a description of its skeleton, simply reminding the student that of all the several genera that go to make up the family *Alaudidæ*, or Larks, but one genus has fallen to the lot of the North American fauna, and that the genus contains but one species, with its varieties, the osteology of that species being the subject of the present article.

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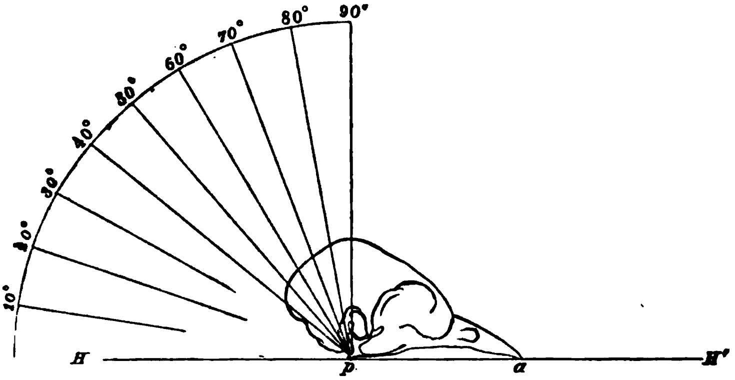
* Wyoming Territory, United States, lat. 42° 23′ 35″ N., long. 105° 21′ 4″ W.

The skull—(Pl. IV, Figs. 22, 25, and 26).—It is a striking characteristic in the skulls of nearly all adult birds that certain bones become firmly united, their sutures entirely disappearing; perhaps in no species of the highly organized suborder *Oscines* has this almost universal avian feature been so thoroughly carried out as in our present subject, the Horned Lark. Occasionally we do find, however, a trace to guide us in locating the original boundaries of the primitive elements, even among the *Oscines*, as the sutures, amidst the parietals and frontals in the cranium of *Lanius*, when maceration is carried to a high degree, but in *Eremophila*, as already stated, there is a total absence of any such indication. If we remove the lower mandible from the skull in any of the class *Aves*, and place the remainder on the horizontal plane, with the basi-cranii downwards, we observe that in different skulls there exists in this position differences in equilibrium, and differences in, what we will call, the *anterior* and *posterior bearing points*, or the points upon which this part skull we are studying, we find, when it is placed as directed above, of the skull rests on the horizontal plane. To illustrate this in the that its equilibrium is quite stable, and that it rests posteriorly upon the tympanics, anteriorly upon the tip of the superior mandible, which constitute, respectively, its posterior and anterior bearing points. In this case there is but one anterior bearing point, with two posterior ones. This is a very common result, but there are at the same time many exceptions to it, as in *Numenius* and many species of the family *Anatidæ*.

Again, if we erect a perpendicular from one of the posterior bearing points, or the posterior bearing point, for sometimes it is the condyle, we find that the planes passing through the circumference of the foramen magnum and the occipital vertebra, and the point where the foot of this perpendicular and the posterior bearing points coincide, make certain angles with the horizontal plane (the ordinary horn protractor is the best instrument to take these angles with), which we will call, respectively, the *angle of the foramen* and the *angle of the base*. These two angles, in many instances, practically coincide, as in our Lark, where they make an angle of 40° with the horizontal plane. In the cut, H H′ is the horizontal plane; *a* the anterior and *p* the posterior bearing points.

These angles also differ in many birds; *e. g.*, the anterior bearing point in *Ardea herodias* is the tip of the upper mandible, the posterior ones being the inner of the three facets on each tympanic; the angles of the planes of the base and foramen about coincide, and is 50°. In many of the Owls and diurnal birds of prey, the bearing points being the same as in the last example (it being, however, the inner facet of two on the tympanics, as a rule), the combined angles, or either of them separately, is very small, or the base and foramen may be found to lie nearly in a plane parallel to the plane upon which the skull rests, or the



angles are 0°. We see then that in the present case, the bearing points being given, the angle of the combined planes is 40°, which fact, even without actually taking the angles in question, conveys to our minds about the "pitch" or relation of the basi-cranii to the other salient features of the skull. Taken accurately, these angles, it is obvious, would have a certain value when we come to compare the various skulls of the class.

The primary elements of the occipital, or first cranial vertebra, have become completely fused together, and with such other bony elements of the vertebra beyond, of the mesencephalic arch, with which they usually articulate. The well-marked superior curved line that limits muscular attachment above would seem to be, and in all probability is, about the position of the lambdoid suture, and the superior boundary of the bone we are describing. This curved line descends and is gradually lost along the boundaries of the mastoids and occipitals on either side. Externally and inferiorly we find the occipital pierced by the usual foramina of the basi-cranii. The group for the exit of the eighth pair of nerves, being the most anterior of all, are situated on either side, in well-marked depressions or pits, some 7 millimetres apart. Back of these and nearer together are the minute precondyloids, looking forwards and outwards for the passage of the hypoglossal nerves. These last foramina are just anterior to the border of foramen magnum; this latter aperture is of good size, comparatively, having antero-posterior and transverse diameters of 3 millimetres each, with an additional millimetre for the oblique diameters, making the latter 4 millimetres each. It is subcircular in outline, its anterior rim passing around a depression that lies just in front of the condyle, giving the latter the appearance of jutting out into the foraminal space. The condyle is nearly sessile, having the merest trace of a neck, hemispheroidal in form, with an horizontal and average diameter of .5 of a millimetre. Above and midway, laterally, the borders of the foramen are encroached upon by the petrosal on either side, giving it rather a constricted appearance; from these points, as we follow the posterior moiety of the foraminal periphery, we find it to be grooved, each groove ending posteriorly within a millimetre of each other, in a minute foramen that traverses the internal table of the cranium upwards, outwards, and forwards for a short distance, thence to arch around, as a sinus, the epencephalic fossa, meet in the longitudinal sinus coming from above. This arrangement obtains in the *Corvidæ*, and some other families, where it is more strongly marked. The diapophyses of the occipital vertebræ are in a plane but a little lower than the basi-sphenoid; they form, as is quite common, the horizontal floor of the cavity of the otocrane, and blend with the surrounding bones. A moderately well-marked "cerebellar prominence" occupies its usual site in the middle line; no openings or foramina are ever to be discovered either at its summit or laterally, as seen in some other birds (*Anatidæ*, *Strigidæ*). It divides the shallow temporal fossæ that slope away from it on either side, and varies somewhat in size in different individuals. From the upper region of the ear and the superior boundaries of the temporal fossæ to the line of that psuedo-articulation, the fronto-mandibular, this bird's cranium is remarkably smooth, and of a clear white, and, owing to the extraordinary amount of diplöic tissue, possessing a peculiar translucency. The median furrow is only well marked as it passes between the orbits; the superior peripheries of these cavities, as constituting one of the boundaries of the surface under consideration, are sharp at first, rounding as they include the lachrymals, and entirely devoid of any notches or indentations. As is usual, all sutural traces are absent (Pl. IV. Fig. 25). The transverse line of the fronto-mandibular juncture is slightly concave backwards along its middle third, the extremiities sloping a little downwards and backwards. The joint motion is only moderately free. No well-marked suture defines its exact locality, as in *Harporhynchus* and others. The bones that go to form the superior mandible, both above and below, are mutually confluent at all their usual points of contact and articulations, with complete obliteration of their original borders. The nearly perpendicular nasals on either side form the anterior boundary of a triangular opening, of which the lachrymals and maxillaries form, respectively, the posterior boundary and base. These triangles are not complete, insomuch as the lachrymals do not meet the infraorbital bars at the inferior and inner angles. They lead into the rhinal vacuity on either side. It must be borne well in mind by the reader that in describing the upper mandible in the skulls of all birds, it invariably presupposes the removal of its horny integumental sheath that it wears during life, and gives to this portion of the cranium a vastly different shape. Either tomial edge is curved and quite sharp; their anterior mergence, or point of the beak, is decidedly rounded, and fully a millimetre in width.

The superior mandible is rather broad at its base; the culmen, originating in a flattened space just anterior to the fronto-mandibular articulation, is rounded throughout its extent and gently curved downwards, while below, the line joining the middle points of the bases of the triangles above mentioned, averages 7 millimetres in length. The sides of the inter-maxillary are smooth, presenting only occasionally a row of very minute foramina for examination; sometimes a faint suture shows itself on either side, extending almost down to the nostril, between this bone and each nasal. Beneath, the palatine fissure is broad and rounded anteriorly, the roof of the mouth beyond being gently concave and grooved mesially for its entire length, and marked by a few foramina. The external apertures of the nostrils are quite large, nearly elliptical in outline, approaching each other within less than .5 of a millimetre above. Their borders, formed by the nasals behind, are sharp; anterior, more rounded. The major axes of these openings average 4 millimetres, the corresponding minor axes 3 millimetres. The planes passed through their peripheries look upward, outward, and forward. The nasals are fan-shaped, both above and below, the expansion being slightly twisted, in order to accommodate themselves to the form of the bill. The broad lachrymals, assisted by the prefrontal, effectually separate the orbital vacuities from the rhinal chambers. The latter are remarkably open, owing to the size in the skull of the various apertures leading into them from without, already described, and devoid of all septa or bony offshoots, although the prefrontal, intermaxillary, and palatines together occasionally develop irregularly formed ethmo-turbinals, that extend into this space from behind and afford the necessary surface for the pituitary membrane. But there is nothing that has the slightest semblance to an osseus septum narium. The anterior olfactory foramina, narrow slits one millimetre long, are found between the lachrymals and prefrontal, close to the vertical septum of the latter; their outer extremities being the superior, they are seen to look downward and forward as they open into the nasal cavities from the bases of the concavities formed by the bones above mentioned.

The orbital cavities are capacious, having rather a forward look; at the same time they look a little downward. Their limiting borders are ovate in outline, with the greater end backward, being incomplete below. Anteriorly the septum that divides them is remarkably entire and of considerable thickness; posteriorly and above there exists quite a deficiency, of a shape shown in Pl. IV, Fig. 22; this is situated just in front of the large quadrilateral rhinencephalic foramen, and allows a good passage from either orbit into the brain-case. The same condition obtains below with the opening for the exit of the optic nerves, only the latter is much smaller and quite circular; to its outer side there are several minute foramina that lead directly into the brain-case. The groove for the first pair is distinct anteriorly on either side, and opens into slits between the prefrontal and lachrymals, similar to those described when speaking of them in connection with the nasal cavities. These, the anterior rhinal foramina, together seem to be the homologue of the "cribriform plate" of anthropotomy. The anterior wall of an orbit is formed by a lachrymal; this bone is larger than usually found in avian crania of this size. It is quadrilateral in form, concave posteriorly, thoroughly confluent with the frontal, nasal, and ethmoid, but not coming in contact either with the palatines or suborbital style. About the middle of its outer border it presents a rounded notch for the lacrymal duct. Its anterior surface, forming the posterior wall for the rhinal vacuity, is undulating, though generally convex.

The superior wall of the orbit is narrow, gently concave, and formed as usual by the frontal. It looks downwards and outwards and merges into the orbito-cranial septum behind, conformably with the shape of the cavity under consideration. The posterior wall of the orbit presents quite a number of interesting points for examination. Internally and above we find the posterior rhinal foramen, and below it the foramen opticus, already described. In addition to other minute openings mentioned above, we have the foramen ovale, occupying a lower plane than any of the others, and situated more external to them, being almost directly behind the orbital process of the tympanic. Above it we observe a thin circular convexity, indicating the locality of the mesencephalic fossa; this sometimes develops at its outer border a sharp, vertical, osseous spine or plate, that points downwards, forwards, and inwards into the orbital cavity. Still beyond this, outwardly, we find another process, or rather two processes combined, with an elliptical foramen between them, placed vertically. The inner portion consists of a square lamina of bone, looking upwards and forwards; the other smaller and outer portion is a trihedral spine that descends, apparently from the frontal, to meet its external margin. The arrangement gives to the entire posterior wall a certain facing, directly forward, forcing upon the cranium of this little bird an aspect peculiar to another family, from which it is far removed—the *Strigidæ*.

The osseous floor of the orbital cavity is always more or less imperfect throughout the class, and is here formed by the customary bones, the tympanic, pterygoid, slightly by the lachrymal, and limited externally by the malo-maxillary squamosal bar.

The palatines nowhere come in contact with each other, and the palatine fissure is very wide, broadly rounded at both ends. The anterior extremity of each of these bones articulates in the usual manner, immovable, with the maxillary and intermaxillary. Back from this point as far as the under surface of the lachrymals, on either side, they are but very slender, straight, and horizontally flattened little bones, without plate or process; at this latter point they suddenly expand into quadrate posterior ends, each slightly inclined downwards towards the median plane, throwing out a thin, nearly vertical plate for articulation with the fan-like and anterior ends of the pterygoids, while mesially they develop two other slender horizontal plates, the superior one being prolonged forward as a fine spicula of bone to meet the ethmo-turbinal mass, as above described.

They lightly touch the rostrum of the sphenoid, in company with the pterygoids, forming the usual arthrodial joint at this point in avian structure. Above they are smooth, look upwards and outwards, and form a portion of the floor of the orbit on either side. The union among the basi-presphenoidal process, vomerine, and prefrontal plates is complete, all sutural traces having disappeared, and the included bones form the interorbital septum as already described. The zygomatic style, very slender, straight, and throughout its continuity nearly of uniform calibre, descends from before backwards from its maxillary articulation to the tympanic, about 4 millimetres, the skull being horizontal.

The coalescence among its three original elements is unusually perfect. Its anterior horizontal expansion is very slight, being crowded towards the intermaxillary osseous tomium on either side by the widely separated palatines.

Its posterior extremity is club-shaped and turned upwards, bearing on its inner aspect a hemispheroidal articular facette for the cotyloid cavity of the tympanic. In no single articulation found in the skeleton throughout the class does there seem to be more variation in plan, to meet the same end and carry out the same function, than we find in the pterygo-palatine with the rostrum of the basi-sphenoid.

In our present subject, as in *Pica* and *Corvus* and many others, this extremity bears a thin expansion that articulates by its anterior edge with the palatine plate and neatly grasps the rounded and inferior side of the rostrum, the two bones not usually coming in contact. The *shaft* of the pterygoid also slightly expands horizontally just before this *articular* surface is developed, more particularly in the angle between the two, adding greatly to the strength of the bone, and somewhat to the floor of the cavity of the orbit. The angle of divergence of the pterygoids in the present instance is exactly 45°; the intertympanic chord, 7 millimetres. The shaft of this bone is comparatively slender, prismoidal in form, somewhat twisted, and develops among the older birds sharp projecting edges. The enlarged tympanic extremity bears a subelliptical articulating facette, that glides upon a similarly formed surface surmounting the pterygoidal process at the base of the orbital process of the corresponding tympanic element. These two little bones are well separated from the basi-sphenoid, and never any evidence of the development of pterapophysial processes is to be observed. As is generally, though by no means universally, the case among birds, the mastoid process of the *tympanic* in this Lark is distinctly bifid, each limb presenting for examination at its extremity an elliptical convex facette for articulation in a cup-shaped cavity intended for its reception in the roof of the aural vacuity. Of the two surfaces, the outer and at the same time the anterior looks outwards, forwards, and upwards, while the inner and posterior one, surmounting the shorter limb or bifurcation, looks backwards and upwards. These two projections of the mastoid process are further separated posteriorly by a deep non-articular depression. The orbital process is well developed, long and slender, terminating in a knobbed extremity, the whole extending well within the orbital space. It has at its base, internally, the facette for the pterygoid already alluded to. This process is subcompressed from before backwards, and has throughout a gentle curvature upwards, having much the form of the thorn of the common rose, without its sharp point.

There are two articular facettes on the inferior side of the mandibular end, divided by rather a deep depression. Of the two, the inner is the larger and more symmetrical in form, being transversely elliptical. The outer one seems to be borne on rather a constricted neck, having on its outer aspect the acetabulum for the hemispheroidal facette on the squamosal. The anterior surface of the body is smooth and triangular in outline; the opposite and inner surface, somewhat similar in appearance, presents for examination, just below the mastoid process, a large, oval, pneumatic foramen; other of these openings may exist in the depression on the posterior surface of the body of the bone already described.

The inferior surface of the *basi-sphenoid* is convex outward, and slopes away gradually into the rostrum, anteriorly. The external orifices of the Eustachian tubes are extremely minute, as are the foramina for the entrance of the branches of the common carotid to the cranium. As already intimated when speaking of the pterygoids, there are no pterapophysial processes.

The external aperture to the cavity of the otocrane is an elliptical slit, 1.5 millimetres wide at its widest part, looking almost directly forwards, its lower end being the innermost or nearest the median plane. The mastoid, however, does not extend so far forwards but that in a direct lateral view we may see, through the opening, the funnel-shaped internal orifice of the Eustachian tube. The stability of the ear cavity is here, as in many birds, highly enhanced by the presence of numerous osseous trabeculæ, acting as struts and braces to its walls.

An examination of the interior of the brain-case shows the fossæ for the several cephalic lobes to be large—indicating a brain of good size for the bird. As already defined, the foramina for the first and second pairs of nerves are in each case single, and as a whole more or less oval. A constriction, however, takes place in their outlines at the middles, formed by the encroaching interorbital septum, so that, looking out of the cavity, the foramen in either case appears double, whereas a view from an orbit reveals the fact of there being but one opening in either case. The olfactory foramen is very large—in the dry cranium—the deficiency being made up by firm membrane in the living Lark. The minute openings for the carotids at the base of the pituitary depression are placed, as usual, side by side transversely. The posterior wall of the sella turcica is deeply notched.

The longitudinal sinus is best seen along the superior and median crest, just before it arrives at the olfactory foramen. The middle fossa for the accommodation of the cerebellum is distinctly marked by long transverse concavities, admitting the rugæ upon the lobe in question when the brain is in situ. With regard to the structure of this bird's cranium, we may say that it is largely cancellated, the intermaxillary and petrosal approaching nearest the compact variety of bone; this fact lends to this part of the skeleton a great lightness, and well-prepared skulls of this Lark are very pretty objects.

The most remarkable feature to be observed, however, is the great amount of separation between the tables of the vault of the brain cavity, being fully a millimetre, and in some localities more, the interspace being filled in by quite an open diplöic tissue. This condition we well know to be a striking feature in the anatomy of the *Strigidæ*, but here is a bird that has the same arrangement as well marked, we believe, for its size, as any Owl in the North American fauna. The outline of the base of the cranium in *Eremophila* approaches the sector of a circle, a figure more or less true in all birds, and here, as in most others, the greatest departure from that figure being a too great convexity of the subtending arc. The length of the radius represented by the middle line is 3.2 centimetres, the intertympanic chord, including the bones, being 1.4 centimetres. We will only mention here, in regard to the free osseous elements of the sense capsules, that the sclerotals retain their usual form and arrangement, numbering in each eye from thirteen to fifteen. The attachment among them is rather firm, remaining as shown in Pl. IV, Fig. 41, after a considerable amount of maceration. The ossicula auditus are also present, but a lens of some power is required to study their form and arrangement.

The hyoid arch—(Pl. IV, Fig. 37, seen from below).—This, the hæmal arch of the parietal vertebra, in no way deviates in this little Lark from the usual ornithic characters possessed by it among living birds, in being freely suspended beneath the cranium and acted upon by certain muscles. The glosso- and cerato-hyals seem to be confluent, and the bone thus formed consists in two narrow little affairs, that for their anterior two-thirds run alongside of each other with a greater or less intimacy, to have their tips slightly diverge anteriorly. Posteriorly the ends have a still greater amount of divergence, and at the junction of the middle and posterior thirds there is a transverse bony bridge, that bears the facette for articulation with the basi-hyal behind. Scarcely any antero-posterior curvature exists. The posterior tips overhang the articulation of the thyro-hyals with the confluent basi- and uro-hyal. These latter have an expansion to accommodate the articulation referred to, bearing on either side small, elliptical, articular surfaces, looking backwards and outwards for the heads of the hypo-branchial elements of the thyro-hyals.

The bone is subcompressed from above downwards, the uro-hyal being produced behind by cartilage, or rather tipped by that material, while the articulation at the anterior extremity of these confluent bones is hidden from view in the superior aspect of the arch by the glosso- and cerato-hyals; and, as is common, the inferior lip that the basi-hyal lends to this joint is the longer, and protrudes forward.

The hypo- and cerato-branchial elements of the thyro-hyals are very long, slender, up-curved little bones, produced posteriorly, as the uro-hyal, by cartilaginous tips.

The shaftlets of these delicate elements are slightly flattened from above downwards, as are the articular heads. The free extremities have a tendency to curve inwards a little, or towards the median plane, as well as upwards.

The lower mandible—(Plate IV, Figs. 22 and 29).—*Eremophila* is another example exhibiting the non-approximation of the tomal edges of the mandibles in the dry skull, this feature being more often absent among *Grallatores* and many of the *Natatores*, where these edges come in contact with almost an equal amount of exactness as where the bill is armed with its horny theca.

The lower mandible of the Horned Lark seems to be, in point of structure, composed almost entirely of compact tissue, and, owing in addition to the thorough coalescence of its primary elements, a very firm and strong bone. Sutural traces, the indicators of the boundaries of pristine segments, have entirely disappeared, and no one would ever suspect, in examining it, the presence of nine original parts, were he not familiar with avian osteology or had the opportunity of dissecting the young. The inferior surfaces of the articular ends are on a level with the major part of the under rim of the rami, but they are well below the coronoidal elevations on either side. They present superiorly the usual undulatory surface to meet and articulate with the condyles of the tympanics. Below appears a longitudinal ridge, due to the extension upon that side of the ramal edges. A knob-like process projects behind, and the true articular processes are sharp and rather long. They are directed inwards, upwards, and then forwards, having the usual pneumatic foramen above and near their pointed extremities. The superior margin of the inferior maxilla starts at once from each articular surface, to rise by a moderate angle to the representative coronoids, a distance of 4 millimetres; it then falls gradually to the rounded and anterior termination of the bone. It exhibits about its middle, on each side, a long but very low convexity, the corresponding shallow concavities being between them and the coronoidal elevations. The "coronoids" are marked by deep groovelets with raised borders, that extend forwards and downwards as far as the interangular vacuity.

The inferior boundary of the bone, as already stated, rises on each side in the inferior articular surfaces, to ascend first for two-thirds of its extent on each ramus, then to fall at about an equal angle, to sweep round and form the anterior and curved termination in the dentary element. The median line on the dentary segment averages 5 centimetres, this portion of the bone being quite thick and concave above, convex below. The general surface, both inside and out, between the boundaries just defined, is in each case depressed, smooth, and translucent until we arrive at the solid dentary portion, where we find it marked by a row of minute pits. Of some dozen or more lower maxillæ before me, one of the most striking differences existing among them seems to be the variation in size of the interangular vacuity or foramen. This is elliptical in outline with the major axis of the ellipse in the long axis of the bone, and in some specimens squarely meet the raised ramal borders within, while in other individuals, even though the bone be larger, this foramen is markedly smaller. A large concavo-convex sesamoid is found between the tympanic and articular end on each side. The long axes of these bones are placed vertically, and their concave surfaces look forwards. They are attached to the middle of the pointed articular processes behind by a delicate ligament, and above by the same means; by a somewhat broader attachment to the squamosals and tympanics, posteriorly.

Spinal column, cervical portion—(Pl. IV, Figs. 22 and 35).—In making a study of the vertebral column of this Lark, the student will find that he will be materially assisted if he make use of an engraver's eye-lens, or, better still, one of the low-power objectives of a good microscope, as some of the points for examination are rather minute, and are not to be so easily or satisfactorily demonstrated by the unarmed eye. The cervical portion of the column is composed of thirteen vertebræ; these enjoy, from the atlantal throughout the entire series, a perfectly free movement among each other by their several articular surfaces; and some form of the sigmoidal curve, characteristic of the bird-neck, is invariably preserved during life and action. We find, too, the majority of the salient points pertaining to these segments described by ornithologists present and strongly marked, and the chief functions of this jointed and bony isthmus well carried out—as affording protection for the myelon in its passage from the brain to the body below, and the vessels from their centre to the brain above. The neural canal, beginning in the atlas as a transverse ellipse, rapidly becomes circular, retaining this form throughout the tube, only to resume the elliptical again in the last two or three segments, where in the thirteenth it seems to be of a larger calibre than at the cranial extremity, the ellipse still being placed transversely.

The usual processes of ten of these vertebræ, the third to the twelfth, inclusive, afford protection to the vertebral artery and sympathetic nerve. By an apparent contraction of the parapophyses in the twelfth, the canal is open laterally in this segment. It is confined to the anterior third on each side of the vertebræ enumerated, and is exceedingly small throughout its extent; its largest calibre being at its commencement, its finest in the tenth or eleventh. Among the long vertebræ in the middle of the neck the anterior entrance of the vertebral canal are ellipses placed vertically. They become more circular as we approach the thoracic end of the chain. On the eighth vertebra, mesially, and beneath anteriorly, we find, bounded on either side by the parapophysial processes, the commencement of the interhyapophysial groove or canal for the carotid artery. It extends through the fourth vertebra with about an equal amount of distinctness and depth. (For names of parts, see Explanation of Plates at the end of this paper.)

It will be seen that the carotid in this Lark is single, and bifurcate at a point about opposite the third cervical vertebra, the branches pursuing their usual courses above.

A neural spine is feebly developed upon the axis posteriorly, this process becoming more strongly marked on the summits of the next three succeeding vertebræ, the remainder of the cervical segments being devoid of this feature, though we have occasionally found an evident attempt at its reproduction in the ultimate cervical. The nethermost portion of the pseudo-centrum of the first vertebra has been considered to be the atlantal hypapophysis Be this as it may, the hypapophysis of the axis certainly has a much greater claim to be termed a *process*, while on the third and fourth segments this spine constitutes one of the most marked features of the vertebra, being a longitudinal and quadrate lamina of bone, equally well developed on the two vertebræ in question, directed immediately forward. In the case of the fifth cervical, the hypapophysis has again degenerated to a minute median point, to be entirely obliterated from the sixth. At the ninth it again makes its appearance as a delicate and flattened plate at the anterior margin of the vertebra beneath, at the point at which in the carotid canal it is first seen in the eighth. In the remaining ones it is prominently developed and directed forwards from the median plane in each vertebra as a quadrate lamina. It is usually triplicate in the last, but does not arise from a common stem, as in other birds.

Parapophysial processes appear as lateral spines first on the third cervical; in the middle of the series they are very long and delicate, being parallel with the centrum of the vertebra to which they belong. They become markedly suppressed near the termination of this division of the spinal column.

Anterior and posterior zygapophyses retain throughout the cervical vertebræ their most common ornithic features; in the middle of the neck the postzygapophysial processes are long and bent slightly towards the neural canal, leaving quite an extensive lozenge-shaped space between them in this region where the cord is unprotected by bone; the interarticular facets among the centra likewise retain their most common avian characteristics. The bodies for the most part seem to be slightly compressed from side to side, with a faint inferior median crest. The fourth vertebra has a delicate and outwardly arched interzygapophysial bar, that includes within it an elliptical foramen on each side of some size. This bony connection in the third vertebra nearly fills in the interzygapophysial space, a very minute vacuity alone remaining.

All the cervical vertebræ appear to be pneumatic, but the foramina in some of them are excessively small and difficult of detection.

What could be more exquisite in texture or offer a prettier subject for study than the atlas of one of the smaller vertebrates such as our present subject? When we see it analyzed in the minutest details, carried beyond its mere gross anatomy, what interest, what wonder we experience, and how we marvel still when we realize the significance of this bone, with its variously modified autogenous and exogenous parts—a vertebra.

Here, in the atlas of *Eremophila*, the bird-head, as far as its bony support is concerned, rests in a diminutive cup not half a millimetre wide or deep, that may or may not be perforated by the odontoid process of the axis; in fact, quite an amount of osseous tissue intervenes, which seems to be due to a short odontoidal style in the majority of instances, rather than a lengthening of that part of the atlas that receives it.

A square bony plate projects from below, more anterior than any other part of the bone, that covers the atlo-axoid articulation in front.

The arch that connects the neurapophyses is broad and smooth, and assists greatly in the protection of the myelon between the two bones.

The odontoid process on the *axis* is concave in front, flat behind, with a roundish summit. It averages one millimetre in length, and is directed slightly backwards. The articular surface at its base is reniform in outline, the centrum that supports it being contracted below. The postzygapophyses show faint traces of anapophysial tubercles; these are better marked in the latter cervicals. The last or thirteenth vertebra has freely suspended from beneath each diapophysial articular surface a rudimentary pleurapophysis that averages about two millimetres in length. These little bones represent the only true cervical ribs, though we must admit here that in several individuals we found the first pair of dorsal pleurapophyses unconnected with the sternum by the usual hæmapophyses, and ending in pointed extremities. Should such a specimen alone be examined, we would have to recognize fourteen cervical vertebræ, the last two bearing free pleurapophyses, but the common rule must dictate here as elsewhere, and the condition just mentioned be reckoned as the exception.

Dorsal vertebræ, vertebral and sternal ribs, sternum—(Pl. IV, Figs. 22, 24, 27, and 38).—The number of vertebræ devoted to the dorsal portion of the spinal column in *Eremophila* seems to be invariably *five*. They are easily detached one from another, and after ordinary maceration of the skeleton drop apart almost as readily as the cervical vertebræ, so that during life there is at least quite a little amount of free movement among these bones.

The neural canal, as it passes through this series, starts with the transverse ellipse as we left it in the last cervical, in the vicinity of the dorsal expansion of the myelon, to terminate nearly circular, and much diminished in calibre, in the ultimate segment of the sacral extremity.

The neural spines form by their interlocking a continuous ridge above. The thickened crest of this ridge is produced by what we will call the arrow-head joint, a true schindylesial articulation to be found in many of the class. The superior margin of each spine becomes pointed anteriorly, extends forward, and is received into a fissure of the posteriorly produced superior margin of the neural spine of the vertebra next beyond it. This arrangement has the appearance of so many little arrow-heads placed in similar juxtaposition, and constitutes one of the elements of stability of the dorsal vertebra in this bird. The open spaces remaining among the bodies of the spines below, between their produced crests and the several neural arches, are filled up by connecting ligament and membrane.

The diapophyses of the dorsals are a very much horizontally flattened series. They are all slightly tilted upwards, the anterior ones being the broadest and shortest, and the ultimate one, by a gradual departure in this regard from the first, the narrowest and longest. In the middle of the series, moderately well developed and antero-posteriorly produced metapophysial ridges are found limiting the diapophyses externally; they do not reach from one vertebra to another. The pneumatic foramina at the bases of these processes are very minute and scarcely discernible by the naked eye.

The inferior diapophysial facettes for the pleurapophysial tubercula are concave-elliptical surfaces, with their major axes parallel to the median line. The anterior ones are the more circular.

The zygapophysial processes, to assist in the intimate proximity of these vertebra, are short and thick. The anterior ones look upwards and inwards, the reverse being the case with the posterior series, which latter develop pointed spines that overlap above, each in its turn, on either side, the vertebra next behind, at the base of the common neural spine. The longer of these processes are found anteriorly; they gradually disappear as we near the sacrum.

The first dorsal hypapophysis consists of three plates, arising from the centrum of the vertebra separately, and arranged as shown in Fig. 38. On the second dorsal we find only a single quadrate plate in the median plane, directed forwards. It occupies a position at the anterior margin of the vertebra, but is produced posteriorly as a low, thin lamina of bone, along the remainder of the centrum mesial to the raised and posterior margin. The third vertebra takes it up in this form, and it is thus passed along the series, constituting a continuous hypapophysial ridge, intersected by the expanded anterior and posterior borders of the centra.

The articular surfaces among the bodies retain their usual characters.

They extend into the ridge just described. The centra of the dorsal vertebra are somewhat compressed in a slightly increasing degree from before backwards; each lateral and anterior margin supplies a nearly circular parapophysis for the pleurapophysial capitula, while at points on the posterior margins in the same plane we find the major share of the notch, which in coaptation of the segments constitutes the subcircular foramina for the exit of the dorsal nerves.

There is a free *pleurapophysis* for each dorsal vertebra, but the first is not always connected with the sternum by a sternal rib, as already defined; it sometimes has all the characteristics of a movable cervical rib; again, when it connects with the sternum, its hæmapophysis articulates rather high on the costal border (Pl. IV, Fig. 22). It may or may not bear an epipleural appendage.

The vertebral ribs of this Lark articulate, as usual, by tubercula and capitula, with the dorsals, meeting par- and di-apophyses in the ordinary manner. The necks of the ribs in the middle of the series are the longest, and often we find among the ultimate ones a slight projection beyond the tubercle, that is received in a corresponding notch at the outer border of the diapophysis it meets. There is but little difference in the width of these flat bones; perhaps the anterior ones have rather the advantage in this respect. Minute apertures, to allow the air to enter their bodies, are observed in the usual localities.

The laterally viewed curve of a dorsal rib is barely sigmoidal; viewed from in front it approaches a portion of the curve of an arc of an ellipse. A ridge continuous with the neck is carried down the inner aspect of each bone, to gradually disappear near its middle. The lower extremities of these ribs are slightly enlarged, to afford space for articulation with the sternal ribs; the surface is convex.

The epipleural appendages of the dorsal pleurapophyses are confluent with the posterior edges of the bones, and situated below their middles. Occasionally the one in the middle of the series has sufficient length to overlap two ribs; in young birds of this species they are much shorter, and the best-developed ones show an angle on their inferior borders just after leaving the rib, as if they had left that bone with the original intention of proceeding downwards and backwards at a gentle angle, but suddenly changing mind, proceeded directly upwards and backwards at an equal angle; hence the condition alluded to.

When the first dorsal rib articulates with the hæmal spine below by the intervention of a sternal rib, this latter bone is quite small and delicate, averaging about 3 millimetres in length, and but slightly curved. The remaining dorsal hæmapophyses become longer and more curved as we follow them backwards. They are all flattened from side to side, their lower extremities being abruptly twisted at right angles with their shafts, enlarged, and terminating in a flattened articular surface for the costal border of the sternum. These articular surfaces are dumb-bell shaped, *i. e.*, contracted in their middles. The upper ends of these sternal ribs are also enlarged and laterally flattened for articulation with the vertebral ribs. These latter enlarged ends are sometimes larger, sometimes smaller, than the extremity of the pleurapophysis they meet.

Through the teachings of philosophical anatomy, we must recognize in the avian hæmal spine or the bone sternum, developed as it may be, the confluent hæmal spines; and in it, in its maturity, see one of the most interesting bones to contemplate, it being one of the most diversified in form in the bird skeleton. Owen styled the type of this bone, as found in the Lark now under consideration, "cantorial" (Anat. and Phys. of Vert., Vol. III). It is certainly typical of the suborder *Oscines*, as far as American ornithology is concerned; good examples as testifying to this I have now before me, in the hæmal spines of *Turdus migratorius*, *Ampelis garrulus*, *Mimus polyglottus*, *Lanius*, and many others.

In *Eremophila* the sternum is very light and delicate in structure; so thin is it in some individuals that we find deficiencies occurring, usually in the body, as foramina of no mean size (1.8 millimetres). Its outer surface, indeed the entire surface of the bone, has the appearance as if it were venated, the solid bony veins being thicker and more opaque than the general surface of the bone, and branching from the various borders.

The carina is moderately well developed, measuring in the vertical line below the coracoidal groove 9 millimetres. Its inferior border, expanded behind, is rounded and somewhat thickened; this thickening disappears on the anterior border, which is sharper and continuous with a conspicuous crest on the front of the manubrium.

The carinal angle, with an aperture of 70°, is quite prominent and produced anteriorly. Just within the anterior margin of the keel we find a rather prominent *carinal ridge*, its lower extremity branching backwards, and by its ramifications taking part in the superficial venation referred to above. The keel arises abruptly from the inferior and median angles formed by the sides of the body where they meet mesiad.

The xiphoidal prolongation is profoundly notched once on each side. These notches have the outlines of isoceles triangles, with their angles rounded, and apices but a short distance from the costal borders. These deep indentations of the xiphoid give rise on either lateral sternal border to a long, stout process, extending backwards and outwards, with dilated extremity.

The outer surface of the body of the sternum presents for examination well-marked *pectoral ridges*, and, running from the bases of the xiphoidal processes to the outer angles of the coracoidal depression, clearly defined *subcostal ridges*.

The *manubrium* is a prominent, superiorly bifurcated, trihedral process, jutting out from a substantial base in the median plane, forwards and upwards, from the angle formed by the coracoid groove and the front border of the carina. At its base internally there is an extensive oval pneumatic foramen. Its bifurcations are rounded, and give attachment at their extremities to firm ligaments, that pass directly to the coracoidal capitula above.

The *groove for the coracoids* is markedly impressed and continuous in front, extending from costal process to costal process; its boundaries form the thickest and stoutest part of the bone we are describing.

The *costal processes*, possessed of broad bases, arise as thin but prominent lamina, upwards, forwards, and outwards, terminated by flattened summits. Their posterior margins bear the costal facets for the articulating ends of the sternal hæmapophyses.

The sides of the body of the sternum on its ventral aspect make an obtuse angle with each other. The line of meeting in the mesial plane is quite evident; its anterior half is the seat of a row of various-sized pneumatic foramina. There are upon each costal border five, sometimes six, transverse facettes for the sternal ribs; the shallow depressions among them are scantily supplied with pneumatic foramina.

The mid-xiphoidal border, in which the keel terminates posteriorly, is thickened; its other boundaries are sharp, with raised ridges below, just within their edges. The greatest length of the sternal body is a little more than two centimetres, and its greatest width a little more than one centimetre, the last measurement taken to the rear of the costal processes.

Sacral vertebræ and ribs, pelvis, coccygeal vertebræ—(Pl. IV, Figs. 22, 23, and 28).—The first sacral vertebra has become thoroughly confluent with the ossa innominata on either side and with the vertebra behind it. Its diapophyses seem to have spread out upon the under surface of the ilia, combining with them, for we observe that the first sacral pleurapophyses articulate in the ordinary manner with the transverse processes and the parapophyses, the tubercula being situated just near the outer iliac borders. This rib may become, as a rare event, confluent with the pelvis, but is usually free. Its hæmapophysis is the longest of the series, and the articular facette on its lower extremity meets the last facette upon the sternal costal border. This sacral pleurapophysis may possess an epipleural appendage, though it seems to be the exception.

The second sacral rib is a delicate hair-like bone of uniform thickness, that does not show any decided tubercle, merely, after leaving the vertebra, coming in contact with the under surface of the ilium, on each side, for the entire interspace between the tubercle and head. It, too, may become confluent with the pelvis on its lower surface.

Extending downwards and forwards by a gentle curve, it meets its hæmapophysis through a miniature articulation. This latter style articulates along the posterior border of the sternal rib of the first sacral pleurapophysis, never reaching the costal border, and the second sacral rib never bears an epipleural spine on its posterior border.

The sacral vertebræ are invariably confluent throughout the chain in the *pelvis* of the Horned Lark; indeed, it is only by a process of staining this remarkable compound bone, and the aid of a strong light, that they can with any satisfaction be counted. There are eleven of them; exceptionally, twelve.

The neural canal, circular at the outstart, shows the usual *pelvic swell*, chiefly anterior to the acetabula, conformable with the *ventricular dilatation* of the myelon in that locality. The exit of this tube distally is likewise nearly circular. The foramina along the bodies of the centra, in the vicinity of the dilatation referred to, are double and placed one above another, for the separate egress of the roots of the pelvic plexus.

The anterior aspect of the first sacral vertebra presents every element and process requisite for articulation with the ultimate dorsal segment. It is largely overshadowed by the ossa innominata. Opposite the iliac contraction, in the neighborhood of the fourth and fifth sacrals, these vertebræ throw out their par- and di-apophysial processes far enough to meet and brace the iliac bones. We do not meet with such braces again until arriving opposite the acetabula and beyond, where the parapophyses project upwards and unite with the outer margins of the transverse processes, the ilia articulating with the free and united borders.

Foraminal deficiencies not unusually occur among these processes, more particularly between the last two sacrals, where they seem to be constant, though of varying size and shape in different individuals.

The last sacral vertebra is markedly compressed from above downwards, retaining, however, all the elements required in articulation with the first and much-modified coccygeal vertebra.

Viewing the confluent sacral vertebræ, or the "*sacrum*", from above, we find the united neural spines, as a vertical lamina, dividing the anterior interiliac space into two capacious *ilio-neural grooves* at that moiety of the bone.

This common neural spine and the ilio-neural grooves proceed backwards until the *gluteal ridge* of the ilium curves outward to the antitrochanter on either side. At this point the spine disappears with the grooves, the sacrum becomes nearly flat and spreads out, to gradually contract again before its ultimate dilatation in the diapophyses of the last vertebra.

The ornithotomist will find, in reviewing the skeletons of our avian types that the ilio-neural grooves, as seen in this bird, are very frequently converted into *canals* in other orders, by meeting of the interested bones above. The condition as defined, however, in the previous paragraph, as relating to *Eremophila*, seems to be characteristic of American *Oscines*. The sacrum is slightly convex from before backwards on its upper surface, moderately concave along the confluent centra below.

The *pelvis* of this bird is uncommonly wide and short, and the ischiadic and pubic posterior extremities remarkably flared outwards. The anterior and inner angle of each ilium, apparently assisted by the diapophysis of the first sacral vertebra from beneath, is pointed; the anterior border slopes backwards gradually, for a distance of 3 or 4 millimetres, to the rounded anterior external angle of the ilium. Between this point and the acetabulum the iliac border is markedly concave inwards, as is the surface of the bone above it, the preacetabular being included between this border and a well-defined *gluteal ridge*. The superior postacetabular iliac surface is nearly square in outline, convex, and equal to a little more than one-third of the bone. It is thin and translucent, its outer and posterior borders receiving the greater share of osseous reënforcement, particularly in the vicinity of the antitrochanter.

Posteriorly, this bone, slightly aided by the ischium, is carried out from an ilio-ischiadic, overhanging crest, as bony processes, with their points turned slightly inwards.

These processes are strongly marked in another of our *Oscines*, *Harporhynchus rufus*, a bird that has a notoriously angular and unique pelvis.

The *antitrochanter* is subelliptical in outline, and faces downwards, forwards and outwards. The articular surface is produced downwards as far as the cotyloid cavity, upwards slightly above the general surface of the ilium, and is bounded posteriorly by the ischiadic notch.

The foramen at the base of the truly hemispherical cotyloid cavity has so far absorbed the bone that really scarcely anything remains of it beyond a cylindraceous acetabular vacuity, the internal and external apertures being circles of equal diameter, and the femur consequently relying almost exclusively upon its fleshy and ligamentous attachments to retain its head in the ring.

Sutural traces of the margins of the pelvic bones as the components of this osseous ring have entirely disappeared, having been obliterated during the pelvic consolidation.

The *ischium*, for its major part, is like the ilium—very thin, more particularly so at its free posterior borders; joining with the ilium behind, it shuts off a large and elliptical *ischiadic foramen*, the superior arc of which is situated just beneath the ilio-ischiadic crest described above. The major axis of this ellipse is directed downwards and backwards.

The posterior extremity of the ischium has an odd-appearing, foot-like termination, that is bent down to meet the *pubis*.

This latter bone is an extremely slender style, that, immediately after assisting in the formation of the cotyloid ring, closes in a small, in fact the smallest of the group, subcircular *obturator foramen* behind; then, running parallel with the ischium, by touching its further end encloses another long spindle-shaped vacuity; it is finally produced beyond that bone by a pointed extremity, that curves backwards and inwards.

It only remains now to say of the pelvis, as far as its internal aspect is concerned—after what we have said in regard to its extreme lightness, its translucency, its sacrum, and its borders—that, in general, superior convexities cause or create internal concavities, and *vice versa*. It is capacious and firmly united; any attempt to remove the ossa innominata, in the adult bird, from the sacral border, invariably results in failure and usually longitudinal iliac fracture.

There are seven *coccygeal* or *caudal vertebræ*, rarely only six, and the *pygostyle;* they are in the skeleton so arranged and articulated that they have, as a whole, a gentle curve upwards, terminated by the quadrate "coccygeal vomer".

These segments are all free, being easily individualized, even before maceration, by simple section of the ligaments that bind them together.

The subcircular neural canal, that passes through them, almost capillary in its dimensions, terminates without passing into the pygostyle.

There is no hæmal canal developed, and indeed hypapophyses are found as stunted tubercles only on the last two or three vertebræ.

A neural spine is developed on each, as a prominent and curved "process" pointing forwards; this spine is wanting, however, on the last caudal.

Of the lateral apophyses the transverse processes seem to be the only ones entitled to any consideration; these, as broad, flattened lamina, extend from each vertebra, downwards and outwards, decreasing in width from before backwards; in fact, each vertebra in the coccygeal series becomes more and more rudimentary as we proceed in that direction.

The articular facettes upon the centra start reniform, to terminate almost circular in the last vertebra; and the zygapophysial processes are exceedingly elementary in character.

The *pygostyle* is parallelogramic in outline, articulating with the ultimate coccygeal vertebra by an unperforated cup-shaped depression, at the middle of its long anterior side. The edge of the bone above this point rests on the posterior border of the neural spine of the last caudal; below it is free.

The superior angle is more or less produced, and the posterior corner of the parallelogram is expanded laterally; this expansion is highly developed in many birds, as in *Colaptes mexicanus* and other members of the family *Picidæ*. The caudal vertebræ are non-pneumatic in our present subject, whereas in the pelvis we find these foramina in their usual localities.

The scapular arch—(Pl. IV, Figs. 22, 30, 32, 33, and 34).—This arch is very strong and perfect in this bird, as it is among the *Oscines* generally.

The bones can be easily separated from each other by maceration, though during life they are remarkably well strapped together and to the sternum by their numerous ligaments.

The *scapula* lays along the dorsum in its usual position over the dorsal pleurapophyses, parallel with the vertebræ, with its posterior point touching the fifth one in the vast majority of the specimens.

Certain bones in all skeletons force upon us their resemblance to familiar objects, and we know many of them have received their distinctive appellations through such likenesses; more particularly is this the case in the skeleton of man, where the bone we are describing is frequently termed the shoulder-*blade*, but how much more blade-like is the scapula in this Lark and many other birds, as far as shape is concerned. It is truly a miniature bony cimeter in *Eremophila.* This is not true for scapulæ of all birds, however, for no one would ever be struck by such a resemblance while regarding the J-shaped scapula of *Colaptes mexicanus*, or the straight, almost square-cut bone in some of our natatorial birds.

In the Horned Lark the scapula is pointed and obliquely truncate behind for more than a third of its slightly dilated posterior portion, on the side towards the vertebræ.

The outer border is reënforced by a rounded ridge for nearly its entire length, while the inner is quite sharp.

The blade becomes stouter and subcompressed as we near the glenoidal process; this broad tuberosity extends downwards, forwards, and outwards, and is crowned on its entire summit by a curved, subcircular, articular facet, that supplies rather more than one-third of the glenoid cavity for the head of the *os humeri.*

The *acromial process* is bifurcated, and the clavicular head rests in the fork. The larger bifurcation is the lower, and both rest against the coracoid, on the inside and just below the head, creating the usual scapulo-coracoid foramen, which in this case is not very extensive.

The scapula is pneumatic, and the foramina are to be found at the extremity of the larger bifurcation of the acromial process, and in the notch between the two.

The *coracoid* can boast of a very fair subcylindrical shaft between its head and inferior expansion. This flared extremity is quite thin outwardly, stouter within, where it appears to be more of an extension and spreading of the shaft in its course downwards. Below there is a narrow crescentic facet for the sternum, and at the upper edge of the exterior and thin side of the dilated end we find a notch, sometimes a foramen, that appears to be constant.

The upper extremity of the coracoid is an irregular tuberosity, consisting of a lower, inner, and smaller process for articulation with the clavicle, and an upper, superiorly convex head, that curls over mesiad to create a fossa, at the base of which we discover a group of various-sized pneumatic foramina. Anteriorly the head shows rather a well-marked process, into which the ligament coming from the horn of the sternal manubrium, of the same side, is inserted.

To the outer aspect, and below the head, is the reniform and vertical facet that, with the scapula and os humero-scapulare, goes to complete the glenoid cavity.

The *os humero-scapulare* is a free bone, rather larger than the patella, found at the upper and posterior angle of the glenoidal process of the scapula. It is an elliptical disc, with a peg-like process extending from it from behind. The outer surface is concave and articular for the completion of the glenoid cavity. This ossicle is held in position by various fibrous ligaments stretching from its borders to the scapular arch and the humerus.

The *clavicles* are thoroughly fused together, forming one deeply U-shaped bone; their cylindrical and curved lengths support at the union, mesially and below, a long lamina of bone, in the median plane, that is directed upwards and backwards, parallel to the anterior carinal crest, to which it is united by ligament in the living bird. Their upper ends are expanded and placed in the skeleton flat-wise against the acromial process of the scapula and the head and the lower or clavicular process of the coracoid. The acromial process, through its bifurcation, partially grasps the hind border of this expanded end of the furculum, on either side.

This bone seems to be non-pneumatic, while the coracoids are hollow almost throughout their entire extent, having in their composition very little cancellous tissue and a thin though firm, compact layer. The scapulæ are hollow for some little distance into their blades, to be terminated by a cancellous structure, with an external and attenuated outer compact coat.

With the scapula arch *in situ*, we observe that the coracoids do not meet below in the coracoidal groove of the sternum, but approach only, on each side, as far as the periphery of the pneumatic foramen at the base and behind the manubrium.

They are directed upwards, forwards, and outwards, at an angle of about 45° with the horizontal plane, the skeleton being erect; and, as a consequence, we find their upper ends further apart than any other part of the bone.

The aperture between scapula and coracoid is in nearly a right angle, and the straight part of the inner scapular borders are parallel, their obliquely cut ends alone slightly turning outwards.

A scapula is 2.5 centimetres long, a coracoid 3 centimetres, the interclavicular space above being 1 centimetre.

In *Turdus migratorius*, as perhaps the best representative of avian structure among the *Oscines*, we find the scapula *shorter* in proportion when compared with the other bones of the arch; the coracoids more depressed, *i. e.*, more in line with the sternum; and the furculum in its direction backwards showing a gentler curve.

The upper extremity—(Pl. IV, Figs. 22, 31, 36, and 43).—The pectoral limb in *Eremophila* maintains the usual ornithic characters of a great number of the class, both in arrangement and number of the bones comprising it. The skeleton arm has *ten* distinct segments; of these, we find one devoted to the brachium, two to the carpus, one to the metacarpus, and four to the phalangeal portion of the manus.

In ornithotomy we find the head of the *os humeri* playing in a shallow glenoid cavity, composed of the glenoid process of the scapula, the humeral facet of the coracoid, and here, in addition, the os humero-scapulare; the homologue of the humerus summus not entering into the scapulo-humeral articulation as an overarching and protecting process, as we find it in human anatomy.

The bone humerus in this bird is more remarkable for its lack of curvature than anything else, being short and straight, as in others of the suborder among which our subject is classed and belongs.

The head of the bone is broad and moderately flexed anconad, developing only a very narrow and thin radial crest, which is bent for its entire extent toward the palmar aspect. This crest, answering to the "greater tuberosity" of anthropotomy, and giving attachment to the usual muscles, extends along on a straight line on the upper aspect of the shaft longitudinally for only about half a centimetre.

The ulnar tubercle, or lesser tuberosity, makes up the thickened and proximal border of the confines of the pneumatic foramen; a deep little pit on its palmar side or margin lodges the extremity of a strong ligament coming from the head of the coracoid of the same side, and materially assists in keeping the head of the humerus in its socket.

The elliptical and convex articulating facet of the head curls over anconad, and from its middle a line runs down the bone for a short distance, being one of the angular boundaries of this the trihedral extremity of the bone. Quite a notch exists between the facet just described and the wall of the pneumatic foramen. This latter is on the under side of the head of the bone, surrounded on its upper, proximal, and lower aspects by a firm bony wall, the lower and proximal parts of which are continuous with the smooth and otherwise unbroken surface of the expanded and palmar side of the "head".

The pneumatic fossa thus formed is deep, having at its bottom the foramen alluded to. Quite often the aperture is multiple, and vast differences in size exist, being very large in some individuals, nearly consuming the base of the fossa where it is found. From the lower boundary of the pneumatic enclosure another longitudinal line is seen on the proximal end of the shaft, limiting the anconal face of the trihedral end of the humerus in this direction. The palmar aspect of the head, broad and smooth, arches gradually inwards and towards the articular facet; it is also slightly convex from above downwards, supposing the bone to be *in situ* and in its position of rest, as we do during the course of our description.

The shaft of the humerus is subcompressed from within outwards, smooth, and, viewing it laterally, it is barely convex above, by virtue of the ends being bent slightly down; viewing it from above, we may say that it is almost straight.

It retains its form until close under the expanded distal extremity, which is curved palmad. On the radial side of this end of the bone we find the transverse and convex elliptical trochlea below, for the sigmoid articulating depression of the ulna. This has inferiorly the quadrilateral internal condyle.

The ulnar convexity is separated from the *oblique tubercle* for the radius most effectually by a deep, well-marked, though narrow, notch.

The oblique tubercle maintains its usual position as formed on this bone in birds generally.

The trochlea surface does not extend inwards very far; *i. e.*, does not pass over the end of the bone. Above it and towards the proximal end appears a distinct and prominent "external condyle".

Anconad this extremity of the humerus presents for examination the upturned internal condyle and a longitudinal tendinal groove, situated opposite the radial convexity, with intervening indentations. This arrangement lends to this aspect of the bone rather an uneven and tuberous look. The nutrient foramen, almost too minute to be observed by the naked eye, is found at the middle and inner aspect of the shaft.

The *radius* is a long, delicate bone, with a bent and compressed shaft. A moderately well-expanded and circular "head" presents the usual concavity for the oblique tubercle of the humeral trochlea, while below is a feebly marked "ulnar facet" and bicipital tuberosity; beyond this, again, the shaft develops a sharp, protruding edge, that extends nearly to mid-shaft and into the interosseous space.

The distal extremity of this bone is spread transversely and curved downwards. It articulates with the upper surface and distal end of the ulna, and is lined above by very minute tendinal grooves. The outer border of this extremity presents a transverse lamina of bone that seems to be superadded to the truly dilated end.

In articulation, the radius at first curves away from its companion, the ulna, to approach it again towards the carpal end, for about the outer third of the shaft, to remain with it until both arrive at the wrist. The distal border of the radius is transversely convex for an articular facette on the scapho-lunar. The *ulna* is the main bony support of the forearm, and, indeed, its shaft is nearly equal in size and strength to that of the humerus itself, having the appearance of being the true continuation of the pectoral limb, so diminutive and slender is the accompanying radius.

Its proximal extremity is the larger, and is gently curved anconad, to meet the corresponding flexure of the brachium to form the elbow-joint, the articular surface engaged being quite extensive and vertically expanded. The lower, circular, and markedly concave trochlea is the greater sigmoid cavity, and is intended for the ulnar tubercle of the humerus. Its proximal margin is so produced as to form a strongly defined "olecranon process", the lower lip of the cavity being the homologue of the "coronoid process", and is so feebly developed as to scarcely deserve the distinction. In close proximity to the greater sigmoid cavity, above, there is another articular surface, quadrilateral in outline, decidedly concave from above downwards, much more shallow in the opposite direction, for the oblique tubercle. Immediately beyond its distal margin is a weak and shallow facette for the side of the head of the radius, so that the oblique tubercle articulates in a cavity furnished by the cupped-head of the radius and the larger quadrilateral trochlea of the cubitus, the two being almost continuous.

The outer aspect of this extremity presents simply certain feeble elevations and depressions for muscles and the ligaments surrounding the joint.

From the proximal extremity the nearly cylindrical shaft curves gently palmad from its inner third only; after that it takes a comparatively straight course for the wrist. The anconal aspect of the shaft presents at the junction of the inner and middle thirds an elliptical nutrient foramen, that enters the bone almost perpendicularly to its long axis. The tubercles for the insertion of the bases of the quills of the secondaries, so prominent on this bone in some birds, as in *Colaptes*, seem to be entirely absent. We find them barely present in *Harporhynchus*, quite strongly marked in *Lanius*. The carpal extremity of the ulna is likewise articular, being vertically cleft and curved downwards. Anconad it develops a rough eminence, and above a depression for the fan-like expansion of the radius. This end, as in the majority of the class, articulates with the three carpal bones and the radius above.

The humerus measures 2.4 centimetres, the ulna 3 centimetres, and the radius 2.7 centimetres; but the bones *in situ* and the wing closed, the anti-brachium projects beyond the brachium about 5 millimetres. The bones of the forearm, though hollow, are apparently non-pneumatic, as is the case with the carpals and long bones of the manus.

As in the great majority of the class, the bird-wrist is composed of the two free carpals and the os magnum, which is confluent with the proximal extremity of the second metacarpal.

The superior and smaller carpal is the *scaphoid*, here an irregularly shaped bonelet, introduced among the cubitus, the radius, and the confluent os magnum, with a distal articular face for the latter and two proximal ones for the trochleæ of the anti-brachium. Between the scaphoid and the cuneiform, the other free and inferior carpal, there exists an interspace, where the ulna meets the *os magnum*.

The *cuneiform* has an elongated facet on its outer aspect for the ulna, and two articular processes that grasp the metacarpal below—an arrangement that admirably meets the action required of the avian wrist.

The last carpal merely constitutes the trochlear head of the confluent metacarpals; by a gentle and backward sweep its general surface is directed inwards.

The composition of the *metacarpal* bone of this bird does not deviate from the general rule, as applied to the class, in any important particular. The three long bones comprising it are firmly anchylosed together and bear the fingers. The shortest and first metacarpal, obliquely fused with the anterior and upper end of the second, supports a free and pointed index digit. The second, or "medius", supports, first in order below, a phalanx peculiar to birds, that is at once recognized by its expanded posterior border. It is here deeply concave on its inner surface, which concavity is partially divided by a feeble transverse line.

The "blade" of this bone is quite thin in some birds, though the general surface is absorbed, leaving nothing but the rounded and limital borders, as in *Larus delawarensis* and others.

The neck of this bone is but moderately constricted between the blade and articular facet for the metacarpal to which it belongs. It bears below another, and the smallest, phalanx of the hand, a little, free, sharp-pointed finger, markedly compressed, that completes the skeletal bird-arm distally, it being the ultimate segment.

The third metacarpal, termed *annularis*, a slender, ribbon-like bone, fast above and below to medius, and extending slightly beyond it, also articulates distally with another free phalanx, of the general character as the index digit and the ultimate joint of the mid-metacarpal, although it is longer than either of them. Measuring along the anterior aspect, from the summit of mid-metacarpal to the point of its last phalanx, we find the manus in *Eremophila* to average 2.6 centimetres.

This, the pectoral limb, as we have endeavored to picture it in this Lark, with its brachium, anti-brachium, and pinion in proportionate equipoise as to length of segments, with its various bones smooth, markedly straight, and devoid of those evidences of being acted upon by powerful muscles, would require but a single glance from the student of avian skeletology to pronounce it as belonging to a bird possessed of a flight barely mediocral in rapidity and power.

Of the pelvic limb—(Pl. IV, Figs. 22, 39, 40, 42, 44, and 46).—The inner aspect of the upper extremity of the *femur* presents the usual globular head for articulation with the cotyloid ring of the pelvis. It is nearly sessile with the shaft, the neck amounting to almost *nil*. A shallow and inconspicuous excavation occurs on the head for the insertion of the ligamentum teres. The articular surface that originates with this hemispherical protuberance extends outwards over the summit of the bone, constantly spreading, until limited by the trochanterian ridge, in a plane with the outer aspect of the shaft; it occupies a slightly higher level than the head, and it is opposed to the anti-trochanter in the articulated skeleton.

Anteriorly the trochanterian ridge and line are quite prominent, extending a short distance down the shaft, to be lost on the general surface; posteriorly it projects outwards horizontally from the articular surface, over a shallow concavity that is found immediately below, that presents at its base a circular foramen that leads to the hollow shaft, and is probably pneumatic, though the femur of this bird does not have the appearance of a bone possessed of pneumaticity; the orifice, if nutrient, is certainly situated in an unusual place, though we must confess that a careful search over the entire shaft with a powerful lens failed to reveal any other opening. The trochanter minor is not represented.

The shaft, for the greater part of its extent, is cylindrical, with a clean superficies, undivided by any intermuscular ridges or lines, or, if so, very faintly, and decidedly convex forwards.

The distal extremity of the femur enters largely into the knee-joint, and is more bulky than the proximal extremity of the bone. It is directed backwards, and, as usual, is divided by an antero-posterior shallow intercondyloid notch, which is continued up the shaft anteriorly, as the "rotular channel," soon to disappear into internal and external condyles. The larger and lower external condyle is longitudinally cleft posteriorly, so as to afford an additional and outer condyloid surface for the head of the fibula, with which it articulates.

A tuberosity is found behind, just above this cleft, and a few others, less prominent and situated more internally, are seen on this aspect of the bone, in the popliteal fossa.

The limiting margin of the internal condyle is sharp and distinct. The ordinary features, as tuberosities and muscular lines and markings, usually sought for at this end of the bone in nearly all birds, are very feebly reproduced in our present subject.

The proximal extremity of the *tibia* has a very interesting form, due to the prominence of the cnemial ridges. These are attached to the head of the bone, well above the horizontal articular surface for the condyles of the femur. Their superior border is continuous and convex upwards; their inferior borders meet the shaft abruptly, and there terminate. Both of these wing-like processes are turned towards the fibular side of the bone, the procnemial process being the larger in every respect; and the ectocnemial sometimes is produced downwards into a very sharp and needle-like spine, a characteristic of other *Oscines*. They include between them a triangular concave and rather deep recess. The expansion supporting the superior articular surface projects over the shaft of the bone in all directions, being quadrilateral in outline, and having an articular facet for the fibula on the outer side, while in the middle of the surface, above, a tuberous spine of the tibia exists, with concavities on either side for the condyles of the thigh-bone.

The shaft is remarkably straight, light, and hollow, though apparently non-pneumatic, no apertures having been discovered to allow the air access to the interior.

A fibular ridge, 4 millimetres long and 1 millimetre deep, is developed in the upper third of the shaft, perpendicular to its outer aspect, for the lower articulation of that bone.

Huxley and Gengenbauer maintain that the distal extremity of the tibia represents the astragalus among the Class *Aves*, and there certainly seems to be some foundation for this assertion, for if we examine this bone in the young of any of the *Gallinæ*, as in *Centrocercus*, we find the segment that eventually ossifies with this end of the tibia to be rather too extensive for a mere epiphysis, and may represent that tarsal bone. Without further remark, then, upon this important and still unsettled question here, we will observe that in *Eremophila*, and in all birds, the leg-bone terminates distally by two anteriorly placed condyles, separated by a well-defined intercondyloid notch. These condyles, approaching each other behind, diverging in front, are reniform in outline and shape, with their convex surfaces downwards. They are higher on the shaft anteriorly, and the articular portion is more extensive. Likewise, anteriorly the shaft is grooved below, to be bridged over just above the "notch" by a narrow bony span, arched outwardly, that holds the tendons of the deep extensors in position.

The inner end of this arch is the higher on the bone, and just above it, on the shaft, we find a minute tubercle, that gives attachment to a ligament that is extended to another tubercle lower down on the shaft, and on the opposite side.

The *fibula* is the merest apology for a bone, represented only by a slender spine on the outer side of the tibia. It has a superior and knob-like head, that articulates with the horizontally expanded head of its sizable companion; lower down it meets the fibular ridge, and is firmly attached to it by a strong, fibrous, and close-fitting connection.

Below the ridge the fibula is continued, hair-like in dimensions, to meet the tibia below the middle of its shaft, to become thoroughly and indistinguishably confluent with it.

The *patella* (Pl. IV, Fig. 22) is a free bone, and is found in the tendon of the quadriceps extensor. It is compressed antero-posteriorly, with an elliptical base above.

From the points representing the vertices of the major axis of this ellipse, bounding lines pass, to meet broadly concave below. The anterior surface, limited by these boundaries, is convex outwards; the posterior surface, slightly concave, is divided by a vertical ridge into two unequal parts, the outer of which is the greater. The femur averages 2 centimetres in length, the tibia 3.2 centimetres, and the bone now to be described as the tarso-metatarsus nearly 2.3 centimetres, falling between the thigh and leg-bone.

The metatarsals of the second, third, and fourth toes, and certain tarsals at the upper extremity of the bone, coalescing, form the segment, *tarso-metatarsus*, next in order below the tibia, with which it articulates.

The articular surface of its summit is so arranged as to accommodate itself to the condyles of the tibia, consisting essentially of an inner and outer antero-posterior facet, and a prominent spine on the anterior margin, that accurately fits in the intercondyloid notch of the bone above.

On the posterior aspect of the bone above we find the "calcaneal" process, here approaching a right parallelopiped in form, being vertically pierced by four minute cylindrical canals, two next the shaft and two parallel with them and above. They are for flexor tendons, which pass through them. The shaft is straight, subcylindrical, and hollow, expanding below for the trochleæ for the phalanges. For its upper half and posteriorly, ranging below the calcaneal process, it develops a sharp vertical crest, that gradually subsides below.

The anterior aspect of the shaft is faintly grooved longitudinally, and where it dies out below, just above the notch between the third and fourth terminal trochleæ, we observe a minute perforating foramen for the anterior tibial artery. Upon the inner margin of the shaft below there is the well-marked though shallow facet for the *os metatarsale accessorium*. This diminutive bone is, as usual, slung to the tarso-metatarsus by a ligament, articulating beyond with the hallux. It represents the first metatarsal, and has all the appearances of one of the larger-sized phalangeal segments, divided obliquely through the shaft, with the cut surface closed in and forming the articular surface for the tarso-metatarsus. Its position, *in situ*, is figured in Pl. IV, Fig. 44. The lower and expanded end of the tarso-metatarsus, bearing the trochleæ of the remaining phalanges, is further conspicuous for the marked manner in which the bone is compressed antero-posteriorly, causing the trochlear ends to be placed side by side, transversely. The middle one is the larger and grooved entirely round, the one for the second toe being slightly the higher and bent a little outwards; finally, the fourth is the smallest. Slit-like spaces among these "processes" completely divide them.

The joints of the toes are arranged upon the most common plan, and, we believe, upon the general rule for all *Oscines; i. e.*, the hallux possesses two phalanges, second toe three, third toe four, and the outer and last toe five.

These joints are not impressed with anything particularly remarkable, beyond what is found in them among the class generally. Their vertically cleft and anterior extremities articulate with the joint beyond, which is diminished in size and articulates in like manner with the next anterior segment.

The claws are grooved laterally, and show a process at their proximal and lower aspects.

A glance at Pl. IV, Fig. 22, will be sufficient to satisfy ourselves that the great length of the claw of the hind toe sometimes seen in *Eremophila*, and always characteristic, is due almost entirely to the growth of the horny theca that encases it, and not to the length of the osseous claw.

In the figure just referred to, the hallux, with the first metatarsal, has been drawn backwards in the skeleton, not only to show the os metatarsale accessorium, but also a sesamoid, of no mean size, that is found on its outer side, an ossicle that betrays its possessor and declares the habit he has of spending a good share of his time upon the ground.

PLATE III.

Various bones of the skeleton.

Fig. 7. Anterior view of skull, the lower mandible having been removed.

Fig. 8. *H*, humerus; *i*, ulnar tubercle; *i'*, oblique tubercle for radius and ulna; *h*, radial crest; *S A* and *S' A'*, scapular arch; *S* and *S'*, scapula; *C* and *C'*, clavicle; *Cr* and *Cr'*, coracoid; *f*, perforating foramen.

Fig. 9. *H'*, humerus; *h''*, radial crest; *p f*, pneumatic foramina; *S A''* and *S A'''*, scapular arch; *S''* and *S'''*, scapula; *C''* and *C'''*, clavicle; *Cr''* and *Cr'''*, coracoid; *f'*, perforating foramen.

Fig. 10. *H A*, hyoid arch; *a*, superior view of atlas; *a'*, the same viewed laterally; *b*, the axis; *o*, its odontoid process.

Fig. 11. Right carpus of *Bubo virginianus*, outer aspect, with the bones composing it moved partly from their normal positions to show articulating surfaces; *rd*, radius: *ul*, ulna; *s*, scaphoid; *c*, cuneiform; *m*, metacarpus; *d*, index digit.

Fig. 12. Right radius and ulna, *Speotyto*, inner aspect; *u*, ulna; *r*, radius; *y*, articular facet for oblique tubercle of humerus, *y'* for ulnar tubercle of humerus.

Fig. 13. The same bones, inferior surface, when in position and the wing closed: *r'*, radius; *u'*, ulna.

Fig. 14. Posterior surface, right metacarpus. The differences in form and position of such portion of the articular surface in the metacarpus as is shown by *z* and *z'*, in Figs. 11 and 14, between *Bubo* and *Speotyto*, are here seen; flat and rounded below in the first, prominent and pointed in the second.

Fig. 15. Anterior surfaces, right tibia and fibula; *F*, fibula; *T*, tibia.

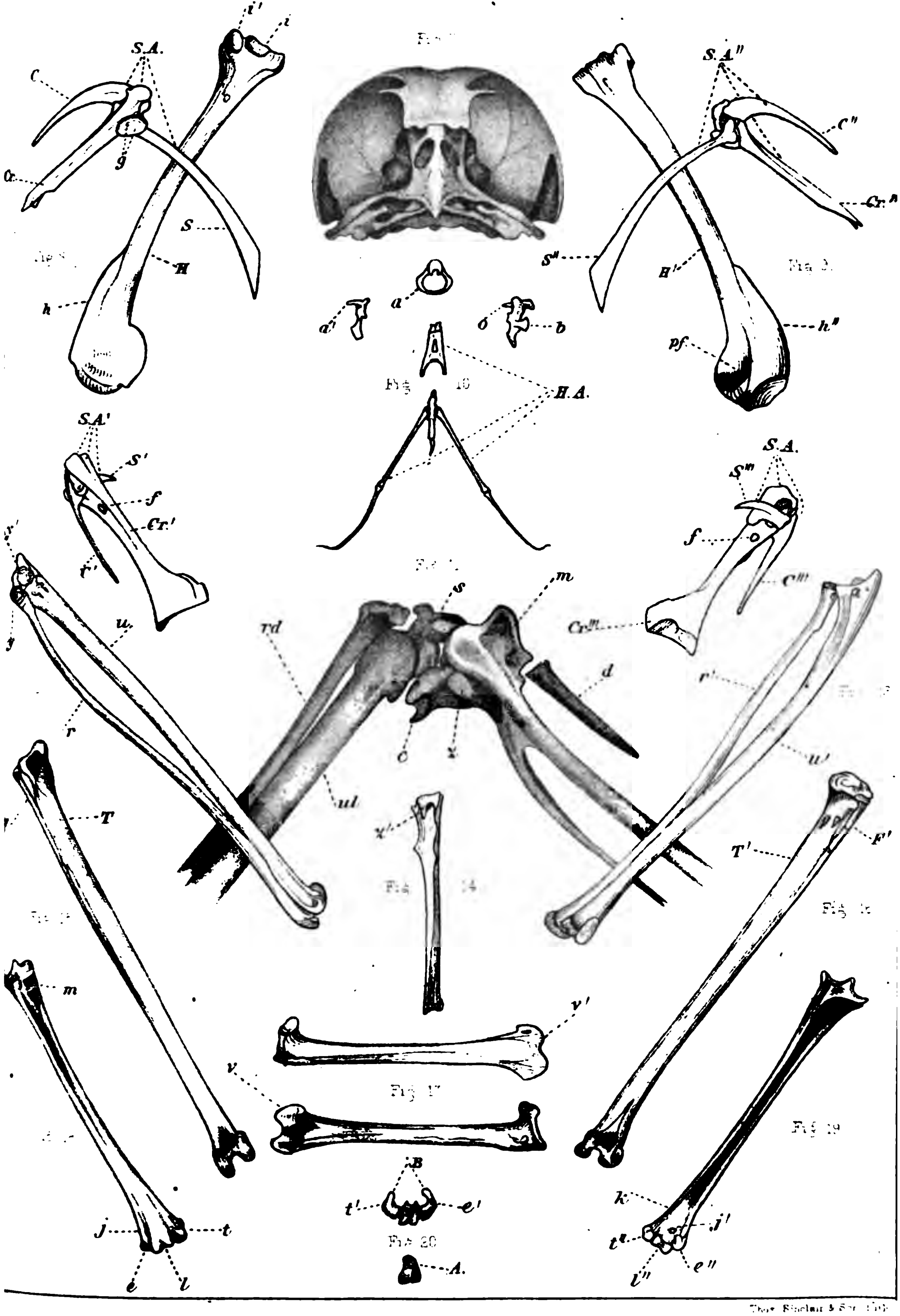
Fig. 16. Posterior surfaces, same bones; *F'*, fibula; *T'*, tibia.

Fig. 17. Right femur; *v*, posterior surface; *v'*, anterior surface.

Fig. 18. Anterior surface, right tarso-metatarsus; *m*, bony bridge over tendons; *j*, foramen for anterior tibial artery; *e*, facet for outer toe, *l*, for middle, and *t* for inner toe.

Fig. 19. Posterior surface same bone; *j'*, the foramen for the anterior tibial artery; *e''* facet for outer toe, *l''* for middle, and *t''* for inner toe; *k*, facet for os metatarsale accessorium.

Fig. 20. *A*, right os metatarsale accessorium, superior surface; *B*, base or inferior surface of right tarso-metatarsus; *e'*, facet for outer toe, *i*, for middle, and *t'* for inner toe. The section of the shaft shows just above the middle facet, on the posterior aspect, ranging near the middle third of the bone.



Thos. Sinclair & Son, Lith.

OSTEOLOGY OF SPEOTYTO CUNICULARIA VAR. HYPOGÆA.

PLATE IV.*

Fig. 22. Skeleton of *Eremophila alpestris.*

Fig. 23. Sacrum and pelvis from above.

Fig. 24. The sternum from below.

Fig. 25. The skull from above.

Fig. 26. The skull from below.

Fig. 27. The sternum from above.

Fig. 28. Sacrum and pelvis from below.

Fig. 29. Lower mandible from above.

Fig. 30. The clavicular furculum from in front.

Fig. 31. Left humerus, anconal aspect.

Fig. 32. Left scapula and coracoid, internal aspect.

Fig. 33. Scapular extremity of clavicle.

Fig. 34. Left scapula and coracoid, external aspect, showing extent of glenoid cavity.

Fig. 35. The thirteenth cervical vertebra, showing first pair of free pleurapophyses.

Fig. 36. Left humerus, palmar aspect.

Fig. 37. Hyoid arch from below.

Fig. 38. Anterior view of sternum, first dorsal vertebra, with its movable pleurapophyses and hæmapophyses, in situ.

Fig. 39. Right tarso-metatarsus, anterior aspect.

Fig. 40. Right femur, anterior aspect.

Fig. 41. Sclerotals, right eye.

Fig. 42. Right tibia and fibula, anterior aspect.

Fig. 43. Right ulna, anconal aspect.

Fig. 44. Right foot, with a portion of the podotheca removed to show the os metatarsale accessorium, in situ.

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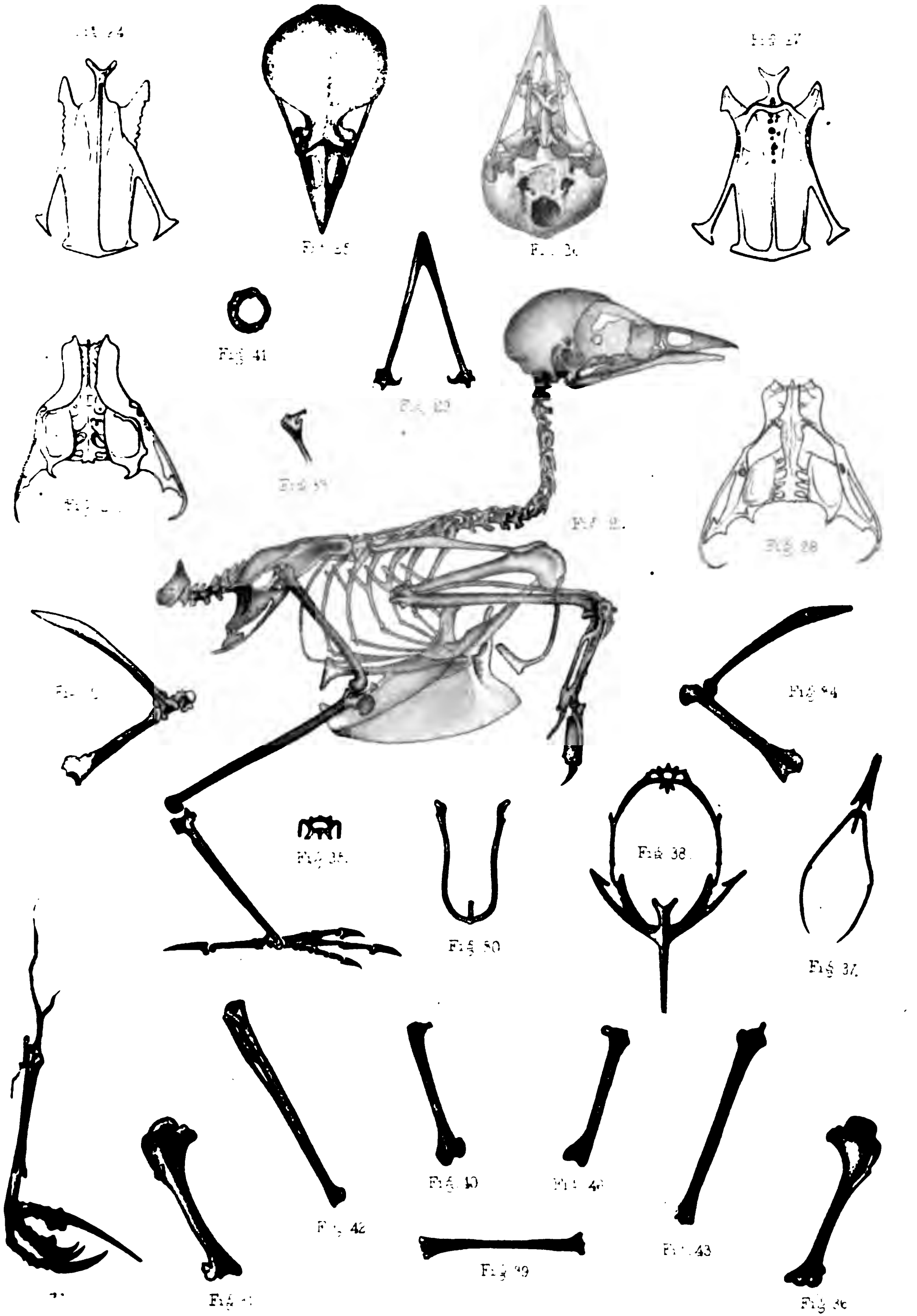
* The figures on this plate are numbered in continuation with the author's plates and figures to his Memoir on the Osteology of *Speotyto cunicularia hypogæa.*



OSTEOLOGY OF EREMOPHILA ALPESTRIS.

Art. VI.—Preliminary List of the North American Species of Agrotis, with descriptions.

By A. R. Grote.

To the kindness of many correspondents I owe a large amount of material in the genus *Agrotis*, and although this is insufficient to allow of a complete revision of our numerous species, yet it has enabled me to prepare the present preliminary list, which will, I hope, be of service to future students. In my collection I have representatives of nearly all the species here cited, and the types of a majority of the forms described by authors in America. Lederer divides the genus into groups, depending on the tibial armature, vestiture, the shape of the genitalia, and the structure of the antennæ. I cannot follow this arrangement now, since of several species I have only one sex, and of others in my specimens the feet are imperfect. The list is then mainly of value for the synonymy; its issue at this time is demanded by the increased attention which is being paid to this department of natural history. The perfect insects belonging to this group are characterized by the eyes being naked, the tibiæ armed (either all or only the middle and hind pair), and the body untufted. The front tibiæ never have a claw, but sometimes the two terminal straight spines on the sides of the joint are notably longer than the rest (*Pleonectopoda*). I have included in this list two species, *aratrix* and *chortalis*, which undoubtedly belong to *Ammoconia*, a group which seems to me to differ only from *Agrotis* by a mesial ridge of scales on the thorax; two other species, *parentalis* and *decipiens*, also show this ridge, but in other characters are more like the typical Agrotids. It remains to be seen whether other species, as yet separated by me, will not come to swell the large genus, such as *Pseudorthosia variabilis* and the species of *Pseudoglæa* and *Chœphora*. It must be remembered that *Agrotis saucia* has a divided thoracic crest.

In the European fauna 170 species are enumerated by Staudinger. Our forms are doubtless much more numerous, since our territory is larger and is but partially explored. In my Check List of 1875 I enumerate 165 North American species. I now cite 205 names. With Europe we have *Chardinyi*, *baja*, *C-nigrum*, *fennica*, *ypsilon*, *saucia*, *carnea*, *plecta*, *prasina*, *occulta*, in common. The Iceland species *islandica* and *rava* are also found in our territory. It is uncertain whether this list is to be further increased by the addition of *augur* (*haruspica*), *obelisca* (*obeliscoides*), and *segetum* (*texana?*). Species which are nearly allied to European forms, but which may be distinguished, are, for instance, *Normaniana*, which resembles *triangulum*, and *clandestina*, which recalls *ravida;* and the differences between the allied forms have been worked out by Dr. Speyer. Other species remain to be compared, as *perquiritata* and *speciosa*. Although it is probable that among the species here cited some are not entitled to that rank, the number of such names is, I believe, very small, and a very much greater number of distinct forms awaits discovery.

The principal writers who have described our species of *Agrotis* are Harris, Guenée, Walker, Mr. H. K. Morrison, the late Mr. C. T. Robinson, and myself; Dr. Speyer has also investigated the allied forms of Europe and America. In the insects injurious to vegetation Dr. Harris mentions five species. The charm of this author's style makes his work a classic, and renders one forgetful of the necessity for greater clearness which his subject demands. Of his five species, *telifera* is a name for American specimens of *ypsilon*, and *inermis* for *saucia*. South American specimens of this last species, which enjoys a wide geographical range, have been also renamed by Dr. Packard (*Ortonii*). Dr. Harris considers his *messoria* as the representative of the European *segetum*. This cannot be the case, if, as is almost certain, *repentis* is this species of Dr. Harris's, too vaguely described to be readily recognized. It has been more recently redescribed by Mr. Riley as *Agrotis Cochranii*. Another species described by Dr. Harris, under the name *tessellata*, was by Dr. Fitch considered as a variety of the European *nigricans*, under the name *maizi*. The last of Dr. Harris's species of *Agrotis* are *clandestina* and Brace's *devastator*, which latter, with its unarmed tibiæ, I have referred to the genus *Hadena*.

M. Guenée refers our species to the distinct genera *Agrotis* and *Noctua;* the yellow-winged species of *Triphæna* are also separated by him generically. We have but one of this latter group in our fauna, *Chardinyi*, originally referred to *Anarta* by its describer, the late Dr. Boisduval. Among the species described by Guenée which I do not recognize in my collection are *ochrogaster*, *elimata*, and *spissa*. Guenée's variety of *tritici* may be *tessellata*.

Mr. Walker's descriptions are so indifferent that a careful examination of the British Museum collection may disturb our synonymy. His *Mamestra* (!) *unicolor* is a new name for our *clandestina*.

The extensive collection of Mr. Henry Edwards contains the unique types of *pallidicollis*, *niveivenosa*, *vancouverensis*, and of *Milleri*, the latter, perhaps the handsomest of the genus, named for the poet of the Sierras, Joaquin Miller. In Mr. Tred Tepper's collection are many of Mr. Morrison's types; Mr. Hulst has the types of *dolis* and *sublatis;* the collection of Mr. E. L. Graef contains many varieties in the genus. I am under special obligations for specimens to Professor Snow and Dr. James S. Bailey.

In different papers, Mr. H. K. Morrison has described many species of the genus. In one of his earliest communications, Proc. Bost. Soc. N. H., p. 162, Dec., 1874, Mr. Morrison says: "I give below a preliminary list, with short descriptions of some new species of *Agrotis*, which will be fully illustrated and compared with allied forms in my forthcoming paper on that genus." The promise has not been fulfilled, and, from the fact that Mr. Morrison has disposed of several of his types, perhaps it cannot be. The species briefly characterized and named are twenty-two in number. It is safe to say that the species could not be recognized from these "short descriptions". The species with which they are compared are often not the species nearest to the new form, as, for instance, *sigmoides*, with which the new species *saxigena* and *claviformis* are said to be allied. Now, *sigmoides* is not at all nearly related to these forms; M. Guenée would place them in distinct genera; nor are they similar in appearance. *Saxigena* is, I believe, certainly the same as the Labrador species *imperita* of Hübner; *claviformis* is more nearly related to *Pachnobia carnea* than to *sigmoides*, which latter belongs to the genus *Noctua*, according to Guenée. Again, *plagigera* is said to be allied to 4-*dentata*, but Mr. Morrison's type belongs to a species more nearly related to *messoria* than to 4-*dentata*. The question as to whether these descriptions are valid or not is simplified by the fact that Mr. Morrison has redescribed a number of them, so that they can be recognized, while in three instances (*bochus*, *simplicius*, and *redimacula*) he has altered and modified the original names. It would seem to be right that these species should only date from their full description, and that the names not again mentioned should be dropped from the lists. It is not necessary here to go over the argument by reprinting any of these "short descriptions". No student who knows the difficulty of the group can hesitate in throwing aside these descriptions as worthless. At least half of them would cover a dozen or more species besides the one intended. Of these twenty-two I have myself described two, *intrita* and *rufipectus*, under Mr. Morrison's names. Of the twenty remaining, Mr. Morrison has described elsewhere seven, viz, *simplaria*, *claviformis*, *brocha*, *redimicula*, *plagigera*, *Rileyana*, *gladiaria;* of the thirteen left, seven must go in as synonyms; *saxigena* I believe to be the same as *imperita; permunda*, Mr. Morrison wrote me, was a redescription of *fumalis* and *perpura* of *Euroides; scropulana*, from the alpine region of Mount Washington, is, I believe, the same as *carnea*, from Labrador, and *opipara*, from the same locality, the same as *islandica;* while I regard *manifestolabes* as the male of *Catherina* (I have been in error in considering my type of *Catherina* a male); and *unimacula* being preoccupied in the genus, must give way to *haruspica* for the North American species which represents the European *augur*. There remain, then, six names, of which two, *decolor* and *exsertistigma*, have found their way into collections. As to *decolor*, Mr. Morrison returned me a form, which I had sent him for description, as the "typical form of *decolor*"; but my *campestris* has also been distributed by him as "*decolor*", and is in many collections under that name. I have described, in the Bulletin of the Buffalo Society, Mr. Morrison's specimen returned to me as *decolor*; but I have my doubts that the form is another species from *campestris*. I have also illustrated *exsertistigma* from specimens returned to me by Mr. Morrison, to whom I originally communicated the species as new. I find that a specimen of the related form, *observabilis*, is labelled as the type of "*exsertistigma*" in Mr. Graef's collection; and, as is the case with "*decolor*", it is evident that distinct forms have been confounded under one name by Mr. Morrison. I believe also that this has happened with *dilucida* and *Morrisoniana*; the "type" of *dilucida*, in Mr. Thaxter's collection, is the *dilucida* of my collection and papers, while, I think, from the description, that Mr. Morrison has originally included specimens of *janualis* with *dilucida*, and that in collections we shall find "type" labels of *dilucida* affixed to specimens of *janualis*. I also think that Mr. Morrison's *Morrisoniana*, from Texas, Proc. Bost. S. N. H., 214, 1875, is *gladiaria*. Of the remaining, one, viz, *stigmosa*, is, I believe, a valid species, though very near *volubilis*; the remaining three, viz, *tenuicula*, *monochromatea*, *cinereomacula*, are unknown to me, and should have no standing as described species. It cannot be thought improbable that Mr. Morrison should have worked carelessly with these descriptions when we reflect that he has redescribed such a commonly known species as *Hyppa xylinoides* as new, under the name *Hadena ancocisconensis*, and a species of *Anarta* as *Orthosia perpura* and *Mamestra curta*, thus referring the same form to different genera easily distinguished by the structure of the eyes. He has also described *Galgula subpartita* as a new *Telesilla*, and a species of *Eustrotia* (*Erastria*) as a *Hadena*, and again as a second species of *Lithacodia!* In an anxiety to find me in error, Mr. Morrison (Proc. Bost. S. N. H., 117, 1875) refers my *gilvipennis* as the same as *Chardinyi*, from Siberia, and adds, "there is not even the usual slight geographical difference in color noticed by Dr. Speyer in insects common to Europe and America". Aside from the fact that Siberia is not in Europe, and that the color of Mr. Morrison's geography is rendered doubtful by his remark, there remains another fact, and that is that the color of the American specimens of *Chardinyi* varies greatly, so that Mr. Morrison is incorrect also in this respect. Maine specimens have the fore wings and thorax purply brown. Mr. Couper's collections in Anticosti varied from reddish brown to a faded yellowish fuscous tint. The size also shows a considerable range of variation. The hind wings also vary in the depth of the band and the consequent extent of the yellow base. It is possible that Mr. Strecker, who, as we have abundantly shown elsewhere, does not understand the structure of moths, and Mr. Morrison, who has made several bad mistakes as to species, are a little hasty in their reference of our single yellow-winged form, but I think that the inspiration has come originally from a European naturalist who has compared the two, which I have not been able to do, and I adopt here the reference as correct.

It is by no means impossible for Mr. Strecker and others to make important changes in synonyms without seeing the species in question, and apparently without reading the original description. So, *C. cœlebs*, which I have originally described as having the wings gray and black, and looking like *consors*, is referred by him as a synonym to *badia*, on the strength of dark and well-marked *brown* specimens of *badia*, which are christened "*cœlebs*", without reference to what "*cœlebs*" really is. The true *cœlebs* has been taken in Canada by Mr. Norman, in Northern New York by Mr. Hill, and in Maine by Mr. Allen. It has deep-black primaries, much shaded exteriorly with gray; the lines distinct, velvety black; the hind wings are like *badia*, to which the form is nearest allied. It seems to connect *badia* with *antinympha*. *Festina lente!*

Agrotis apicalis n. s.

Deep brown, shaded with black. Fore wings uniform deep brown, with the veins blackish and shaded with black from the reniform to the external margin, the black color spreading to the costal edge of the wing. Median lines propinquitous, subparallel, black, lunulate, geminate. Stigmata concolorous, moderate, indistinct. Claviform obsolete. Posterior line feebly exserted superiorly, angulate on vein 4. Some terminal interspaceal linear shades; no traces of subterminal line apparent; anterior line perpendicular, more noticeably waved and geminate than the posterior line. Hind wings fuscous, beneath paler, with mesial line. Thorax and abdomen untufted, smooth. Head and collar blackish; thorax brown, with deeper edges to the tegulæ. Tibiæ all armed, anterior pair with two long, terminal, straight spines; eyes naked; clypeus rough. Colorado. Length of primary, 15 mil. Resembles *opaca;* the apical shading gives the species a resemblance to some forms of *cœlodasys*. Very distinct by its color and the course of the median lines.

This species belongs to the section *Pleonectopoda*, which I have incorrectly taken as a fresh generic type. It is characterized by the spinose fore tibiæ having the rows of spinules terminated by a much longer spine on each side of the joint. The term may come to be used for a section of the genus when the armature of all the species becomes known. It has been incorrectly used by Mr. Morrison, who afterwards pointed out to me that the type of the genus, *Lewisii* Grote, was not generically separable from *Agrotis*, and that the characters given by me are unessential. (Bull. B. S. N. S., 1, 136.)

Agrotis cloanthoides n. s.

♀. All the tibiæ spinose, the anterior pair with two longer straight spines at the end of the joint. Eyes naked; body untufted. Closely allied to *albalis*, from Nevada, but differing by the clear whitish fuscous and black colors, whereas *albalis* is shaded over with soft grayish white, obscuring the markings. Colors of *lagena*. The stigmata are quite small, as in *albalis*; the cell black; the orbicular elongate white streak; the reniform upright. Lines obliterate. A fine white basal ray, edged below with a black line and above with a blackish shade. The interspaces are shaded longitudinally with fuscous and blackish. The white subterminal line is as in *albalis*, but followed by interspaceal black and fuscous stripes and marks. Fringes fuscous, cut with whitish at extremity of veins. Hind wings white. Thorax fuscous gray, with black lines on the tegulæ. Expands 35 mil. Colorado, Mr. Graef. The interspaceal dark stripes give the insect the appearance of an *Actinotia* (*Cloantha*).

Agrotis rubefactalis n. s.

♂ ♀. In size, ornamentation, and structure this species closely resembles *Agrotis messoria*, a species which occurs with but little variation from east to west across the continent. The new species differs at once by the red-tinged fore wings and thorax, by the fact that the collar has a broad black line, and by a prominent black and even shade which precedes the subterminal line on primaries. Lines geminate, black, filled in with the paler ground-color. Stigmata smaller than in *messoria*, pale-ringed; orbicular round, with dark central dot; reniform upright, excavate outwardly, with dark centre; median shade black, diffuse, and quite distinct. Secondaries dark fuscous, nearly unicolorous in both sexes, with paler fringes. Washington Territory. Two fresh specimens. The color is that of *messoria* and its allies, but shot with reddish, so that the species looks like *brunneigera* with the ornamentation of *messoria*.

AGROTIS Hübn. Tentamen.

(Type: Noctua segetum *S. V.*)

Chardinyi *Boisd.*, Index, 94; Guen., Noct. 1, 317; *gilvipennis* Gr., 6th Peab. Rep. 28.
  North. N. Y.; Anticosti; White Mountains; Maine.
badicollis *Gr.*, Bull. B. S. N. S. 1, 136.
  N. Y.; Mass.
dilucida *Morr.*, Proc. Ac. N. S. Phil. 55, 1875.
  N. Y.; Mass.
janualis *Gr.*, Bull. Geol. Surv. 4, 169.
  N. Y.; Mass.; W. Va.
pallidicollis *Gr.*; *Agrotis cinereicollis* ‡ Grote (non. Guen.), Bull. B. S. N. S. 3, 79, pl. 4, fig. 6.
  California.
opacifrons *Gr.*, Bull. Geol. Surv. 4, 170.
  N. Y.
sigmoides *Guen.*, Noct. 1, 325.
  N. Y.; Eastern States.
perattenta *Gr.*, Can. Ent. 6, 131.
  Maine; N. Y.
attenta *Gr.*, Can. Ent. 6, 131.
  Maine; N. Y.

stellaris *Gr.*, Can. Ent. 12, 153.
  Wash. T.; Nevada.
phyllophora *Gr.*, Bull. B. S. N. S. 2, 61; *Dahlii* var. Guen., Noct. 1, 332.
  Can.; N. Y.
rubifera *Gr.*, Can. Ent. 7, 207; *rubi* ‡ Gr.
  Can.; N. Y.; Eastern States.
conflua *Tr.*, 6, 405.
  Anticosti.
perconflua *Gr.*, Ann. Lyc. N. H. N. Y. 9, 1876.
  N. Y.; Eastern States.
rosaria *Gr.*, Bull. Geol. Surv. 4, 172.
  California.
†elimata *Guen.*, Noct. 1, 333.
  Georgia.
Hilliana *Harvey*, Can. Ent. 10, 55.
  N. Y.; Nevada.
baja *S. V.*, 77; Speyer, Stett. Ent. Zeit. 122.
  Eur.; Can.; Middle and Eastern States; Vancouver.
Normaniana *Gr.*, Tr. Am. Ent. Soc. 89, 1874; *obtusa* Speyer, Stett. Ent. Zeit. 124.
  Can.; Eastern and Middle States.
Fishii *Gr.*, Bull. U. S. Geol. Surv. 4, 175.
  Maine; Mass.
conchis *Gr.*, N. Am. Ent. 1, 43.
  Colorado.
mirabilis *Gr.*, N. Am. Ent. 1, 39.
  Colorado.
C-nigrum *Linn.*, S. N. 10, 516; Speyer, Stett. Ent. Zeit. 126.
  Eur.; Can.; Middle and Eastern States.
bicarnea *Guen.*, Noct. 1, 328; *Feltia ducens* Walk., C. B. M. Noct. 203; Grote, List, 9.
  Can.; Middle and Eastern States.
innotabilis *Gr.*, Proc. A. N. S. Phil. 202, 1874; Can. Ent. 12, 154.
  Calif.; Wash. Terr.
Treatii *Gr.*, Can. Ent. 7, 186.
  Mass.
juncta *Gr.*, Bull. U. S. G. Surv. 4, 171.
  Nova Scotia.
haruspica *Gr.*, Bull. B. S. N. S. 2, 214; *unimacula* Morr. (non Staudinger); *augur* var. *grandis* Speyer, Stett. Ent. Zeit. 122.
  Can.; Eastern and Middle States.
sierræ *Harvey*, Can. Ent. 8, 37.
  Sierra Nevada.
mercenaria *Gr.*, Bull. U. S. G. Surv. 4, 171.
  Texas.
inconcinna *Harvey*, Bull. B. S. N. S. 3, 9.
  Texas.

auxiliaris *Gr.*, Bull. B. S. N. S. 1, 196. var. *agrestis* Gr., Bull. U. S. Geol. Surv. 3, 118. var. *introferens* Gr., Proc. A. N. S. Phil. 423; Bull. B. S. N. S. pl. 3, fig. 10.

Colorado; Texas.

perexcellens *Gr.*, Tr. Am. Ent. Soc. 115, 1875; *excellens* ‡ Gr. (n. b. c.).

Vancouver Island.

Wockei *Moeschl.*, W. E. M. 130, 1862, F. 1, 2.

Labrador.

† okakensis *Pack.*, Labr. 38, 1867.

"Labrador."

† umbrata *Pack.*, Proc. B. S. N. H. 11, 37

"Labrador."

gularis *Gr.*, Proc. A. N. S. Phil. 424, 1875

Canada.

turris *Gr.*, Can. Ent. 226, 1875.

N. Y.; Can.; Mich.

† spissa Guen., Noct. 1, 261.

"Am. Sept."

fennica *Tausch.*, M. Mosc. 1, T. 13, 4; Guen. 1, 270.

Kodiak; Can.; Middle and Eastern States.

evanidalis *Gr.*, Bull. U. S. Geol. Surv. 4, 172.

California.

subgothica *Haw.*; Steph., 2, 126, pl. 22, fig. 3; *Agr. jaculifera* Guen., 1, 262, pl. 5, fig. 4.

Can.; Eastern and Middle States.

tricosa *Lintner*, 26th Ann. Rep. 159. var. A, *jaculifera* Guen., Noct. 1, 262.

Can.; U. S., east of Rocky Mts.

herilis *Gr.*, Bull. B. S. N. S. 1, 96. ? var. B, *jaculifera* Guen., Noct. 1, 262.

Can.; U. S., east of Rocky Mts.

plecta *Linn.*, F. S. 321; Grote, Proc. E. S. Phil. 1, 218.

Can.; Middle and Eastern States.

† ochrogaster *Guen.*, Noct. 1, 327.

"Am. Sept."

vittifrons *Gr.*, Proc. E. S. P. 3, 527, pl. 5, fig. 8.

Colorado.

obeliscoides *Guen.*, Noct. 1, 293; *sexatilis* Gr., Bull. B. S. N. S. 1, 100.

Colorado; Eastern and Middle States.

lacunosa *Morr.*, Bull. U. S. Geol. Surv. 4, 172.

California.

insularis *Gr.*, Bull. B. S. N. S. 3, 82.

Vancouver.

costata *Gr.*, Bull. B. S. N. S. 3, 80.

Vancouver.

idahoensis *Gr.*, Bull. U. S. Geol. Surv. 4, 171.

Idaho; Nevada.

formalis *Gr.*, Bull. B. S. N. S. 2, 61.
California.

facula *Gr.*, Bull. B. S. N. S. 3, 82.
California.

emarginata *Gr.*, Bull. B. S. N. S. 3, 82.
California.

exsertistigma *Morr.*, Bull. B. S. N. S. 3, 79, pl. 4, fig. 8.
California.

observabilis *Gr.*, Can. Ent. 7, 144.
California.

bicollaris *Gr.*, Bull. U. S. Geol. Surv. 4, 173.
California.

lætula *Gr.*, Bull. B. S. N. S. 3, 83.
California.

cupidissima *Gr.*, Can. Ent. 7, 101.
California.

cupida *Gr.*, Proc. Ent. Soc. Phil. 3, 525, pl. 5, fig. 7. *var.* brunneipennis *Gr.*, C. E. 7, 187.
Can.; U. S., east of Rocky Mts.

alternata *Gr.*, Proc. E. S. Phil. 3, 236, pl. 5, fig. 8. var. præc.?
Same localities.

minimalis *Gr.*, N. Am. Ent. 1, 45.
Colorado.

placida *Gr.*, Ann. N. Y. L. N. H. 305, 1876.
N. Y.; Colorado.

orbis *Gr.*, Bull. B. S. N. S. 3, 83.
Colorado; California.

variata *Gr.*, Bull. B. S. N. S. 3, 83, pl. 4, fig. 12. var. ? *varix* Gr. id.
Calif.; Nevada.

discoidalis *Gr.*, Bull. B. S. N. S. 3, 82, pl. 4, fig. 9.
California.

brunneicollis *Gr.*, Proc. E. S. Phil. 3, 524, pl. 5, fig. 5.
Middle and Eastern States.

clandestina *Harr.*, Ins. Inj. Veg. 448; Grote, Trans. A. E. S. 2, 309; Speyer, S. E. Z. 131; *Mamestra unicolor* Walk., C. B. M. 233, 1856.
Canada; Eastern and Middle States.

var. havilæ *Gr.* This form is paler, with the dentations of the lines more prominent. Hy. Edw., No. 5627.
California; Nevada.

rufipectus *Morr.*, Ann. N. Y. L. N. H. 304, 1876.
New York.

§ ANICLA Grote.

incivis *Guen.*, Noct. 1, 274; *Anicla alabamæ* Gr., Bull. B. S. N. S. 2, 159.
Southern States.

lubricans *Guen.*, Noct. 1, 323.
U. S., east of Rocky Mts.

cænis *Gr.*, N. Am. Ent. 1, 44.
  Colorado.
simplaria *Morr.*, Proc. B. N. H. 210, 1875.
  Texas.

N. B.—This species is not yet adequately described. It is dusky gray the primaries darker outwardly, a black streak on the cell, the small reniform black-ringed, a black submedian streak, a black dotted line before the fringe. Thorax concolorous, unlined. Hind wings whitish.

nigrovittata *Gr.*, Bull. B. S. N. S. 3, 77.
  Texas.
† digna *Morr.*, Proc. B. S. N. S. 115, 1875.
  "Texas."
bostoniensis *Gr.*, Proc. A. N. S. P. 203, 1874.
  Eastern and Middle States.
scandens *Riley*, Ent. Rep. 76.
  Ohio; N. Y.

N. B.—This species varies in the fore wings and thorax becoming flushed with reddish.

murænula *G. & R.*, Tr. Am. Ent. Soc. 1, 352.
  Middle and Eastern States.
dolis *Gr.*, N. A. Ent. 1, 91.
  Colorado.
catenula *Gr.*, N. A. Ent. 1, 44.
  Colorado.
choris *Harvey*, Can. Ent. 8, 37.
  Nevada.
atrifera *Gr.*, Bull. U. S. G. S. 4, 173.
  California.
vernilis *Gr.*, Can. Ent. 11, 57.
  Nevada.
imperita *Hübn.*, Zutr. 447; *comparata* Moesch., W. E. M. 6, 131, pl. 1, fig. 5; *saxigena* Morr.
  Mount Washington; Labrador.
perquiritata *Morr.*, P. B. S. N. H. 136 (*Polia!*), 1874; *Baileyana* Gr., N. Am. Ent. 1, 92. An spec. seq.?
  White Mts.; Northern New York.
† speciosa *Hübn.*, 491; Moesch., W. E. M. 8, 196.
  Labrador.
euroides *Gr.*, Pr. A. N. S. P. 202, 1874; *Agr. perpura* Morr.
  California.
Milleri *Gr.*, Bull. B. S. N. S. 3, 78, pl. 4, fig. 4.
  Sierra Nevada.
vocalis *Gr.*, Can. Ent. 11, 56.
  Nevada; Colorado.
Hollemani *Gr.*, Can. Ent. 6, 153.
  California.

sileus *Gr.*, Can. Ent. 7, 167.

Nevada.

albalis *Gr.*, Bull. U. S. Geol. Surv. 4, 175.

Nevada.

cloanthoides *Gr.*, n. s.

Colorado.

infimatis *Gr.*, N. Am. Ent. 1, 93.

California.

lagena *Gr.*, Can. Ent. 7, 26.

Nevada.

biclavis *Gr.*, Bull. U. S. Geol. Surv. 5, 206.

Arizona.

pluralis *Gr.*, Bull. U. S. Geol. Surv. 6, 144.

Nevada.

pleuritica *Gr.*, Check List, 47.

Canada.

pitychrous *Gr.*, Bull. B. S. N. S. 1, 82; *Agr. personata* Morr., P. B. S. N. H. 238, 1876.

Middle and Eastern States.

niveivenosa *Gr.*, Bull. U. S. G. S. 5, 206.

Colorado.

olivalis *Gr.*, N. Am. Ent. 1, 43.

Colorado.

4-dentata *G. & R.*, Proc. E. S. P. 4, 491, pl. 3, figs. 2, 3.

Colorado.

cicatricosa *G. & R.*, Proc. E. S. P. 4, 492, pl. 3, fig. 4.

Colorado.

recula *Harvey*, Can. Ent. 8, 37.

Oregon.

Ridingsiana *Gr.*, Bull. B. S. N. S. 2, 305.

Colorado.

Lewisii *Gr.*, Bull. B. S. N. S. 1, 137, pl. 4, fig. 10.

Colorado.

tessellata *Harr.*, Ins. Inj. Veg. 445. var. *atropurpurea*, Gr., B. U. S. G. S. 3, 118.

Middle and Eastern States; Colorado.

versipellis *Gr.*, Can. Ent. 7, 172, pl. 1, fig. 9.

Can.; Middle and Eastern States; Calif.

campestris *Gr.*, Can. Ent. 7, 118, pl. 1, fig. 6. var. *decolor* Morr., Bull. B. S. N. S. 3, 212.

Can.; Middle and Eastern States.

albipennis *Gr.*, Bull. B. S. N. S. 3, 80.

Calif.; Middle States.

♀ *var.* nigripennis *Gr.* This form differs by the blackish secondaries. I only know females from N. Y.

redimicula *Morr.*, P. A. N. S. Phil. 57.
Colorado; Eastern and Middle States.

N. B.—Varies by the thorax becoming brown and the primaries suffused with dark brown.

verticalis *Gr.*, Bull. B. E. S. 3, 29.
Colorado.

strigilis *Gr.*, Bull. B. S. N. S. 3, 81.
Vancouver.

apposita *Gr.*, Bull. U. S. G. S. 41, 170.
Vancouver; Wash. T.

geniculata *G. & R.*, Tr. Am. E. Soc. 1, 349, pl. 7, fig. 54.
Eastern and Middle States.

collaris *G. & R.*, Tr. Am. E. S. 1, 348, pl. 7, fig. 53.
Eastern and Middle States.

badinodis *Gr.*, Can. Ent. 6, 13.
Texas; Middle and Eastern States.

Bollii *Gr.; Agrotis hilaris* ‡ Gr. (n. b. l.), Can. E. 12, 153.
Texas.

N. B.—There is already a European species *hilaris*.

† hero *Morr.*, Proc. B. S. N. H. 238, 1876.
"Mass."

N. B.—This species must differ from *Bollii*, for the fore tibiæ are said to be unarmed, whereas in *Bollii* they are spinose; the color also differs and the lines are said to be "simple" and "dark brown"; the discal spots on secondaries and beneath are said to be present in *hero*, whereas in *Bollii* they are absent.

atrifrons *Gr.*, Bull. B. S. N. S. 1, 97
Colorado.

piscipellis *Gr.*, Can. Ent. 10, 233.
Colorado.

citricolor *Gr.*, Can. Ent. 12, 154.
Colorado.

N. B.—Some specimens have the fore wings more marked than my type and shaded with reddish. This species must not be confounded with *Copablepharon absidum* Harvey (redescribed by Mr. Strecker as *Ædophron grandis*), which has also spinose tibiæ and is without markings, of a deeper yellow, varying by having longitudinal grayish fuscous shadings on the fore wings, and is, I believe, generically distinct from *Agrotis*.

perpolita *Morr.*, Proc. B. S. N. H. 237, 1876.
Middle and Eastern States.

velleripennis *Gr.*, 6th Ann. P. Rep. 29.
N. Y.; Mass.; Calif.

† fauna *Morr.*, Proc. B. S. N. H. 237, 1876.
"Lower California."

balanitis *Gr.*, Bull. B. S. N. S. 1, 97.
  Colorado.
messoria *Harr.*, Ins. Inj. V. 444; *repentis* G. & R.; *Cochranii* Riley.
  Can.; Atlantic States to Calif.
friabilis *Gr.*, Can. Ent. 7, 187, pl. 1, fig. 5.
  Can.; N. Y.
†infracta *Morr.*, Proc. B. S. N. H. 115, 1875.
  "Colorado; Texas."
fuscigera *Gr.*, Can. Ent. 6, 155.
  California.
brunneigera *Gr.*, Bull. B. S. N. S. 3, 80.
  California.
rubefactalis *Gr.*, n. s.
  Washington Terr.
satis *Harvey*, Can. E. 8, 36.
  California.
micronyx *Gr.*, Bull. U. S. G. Surv. 10, 171.
  California.
plagigera *Morr.*, Proc. A. N. S. Phil. 57, 1875.
  Colorado; Western States.
fumalis *Gr.*, Bull. B. S. N. S. 1, 98.
  New York; Eastern States.
comosa *Morr.*, Proc. B. S. N. H. 238, 1876.
  Colorado.
Rileyana *Morr.*, Proc. A. N. S. P. 58, 1875.
  Ill.; Miss.; Calif.
feniseca *Harvey*, Check List, 25.
  California.
littoralis *Pack.*, Proc. B. S. N. H. 11, 36.
  Labrador.
intrita *Morr.*, Can. Ent. 7, 68.
  Vancouver.
carrissima *Harvey*, Check List, 25.
  California.
eriensis *Gr.*, Bull. U. S. G. S. 4, 172.
  New York.
rava *H.-S.*, 544; Moesch. W. E. M. 4, 367.
  Labrador.
fusca *Boisd.*, Sc. 48, 4; ♂ *septentrionalis* Moesch., W. E. M. 133, 1862.
  Labrador.
† oblata *Morr.*, Proc. B. N. H. 116, 1875.
  "Anticosti."
islandica *Staud.*, S. E. Z. 232, 1857; *opipara* Morr.
  Mt. Washington; Labr.; Iceland.
dissona *Moesch.*, W. E. M. 4, 365, Taf. 9, fig. 4.
  Labrador.

Worthingtoni *Gr.*, N. Am. Ent. 1, 91.
  Indiana.
sublatis *Gr.*, N. Am. Ent. 1, 91.
  Colorado.
munis *Gr.*, N. Am. Ent. 1, 38.
  Colorado.
violaris *G. & R.*, Tr. A. E. S. 1, 353, pl., 7, fig. 59.
  Middle States.
† Staudingeri *Moesch.*, W. E. M. 132, Taf. 1, fig. 4.
  Labrador.
† Westermanni *Staud.*, Stett. Ent. Z. 303, 1857.
  Greenland.
† Drewseni *Staud.*, S. E. Z. 302, 1857.
  Greenland.
† olivia *Morr.*, Proc. B. S. N. H. 238, 1876.
  Utah.
Wilsonii *Gr.*, Bull. B. S. N. S. 1, 35.
  California.
æqualis *Harvey*, Can. Ent. 8, 36. var. præc.?
  California.
specialis *Gr.*, Bull. B. S. N. S. 2, 62.
  California.
basalis *Gr.*, N. Am. Ent. 1, 38.
  Colorado.
mimallonis *Gr.*, Bull. B. S. N. S. 1, 98; *rufipennis* Gr., Can. Ent. 7, 83.
  Middle States; Colorado; Nev.
gagates *Gr.*, Can. Ent. 7, 68.
  Colorado.

N. B.—The male of this species has the hind wings white. It is distinguished from *mimallonis* by the dark-brown color, by the orbicular spot being annulated with pale, and by the pale subterminal line. I have the typical *mimallonis* also from Colorado, and there can be no doubt that *gagates* is distinct, though at first I overlooked their near resemblance.

Catherina *Gr.*, Can. Ent. 117, 1874, ♀ (not ♂); C. E. 1875, pl. 1, fig. 7;
    ♂ *manifestolabes* Morr.
  Can.; Eastern States.
† manifesta *Morr.*, P. B. S. N. H. 116, 1876.
  New York.
† hortulana *Morr.*, P. Ac. N. S. P. 430.
  California.
† tristicula *Morr.*, P. A. N. S. Phil. 429.
  "Maine."
Fernaldi *Morr.*, P. A. N. S. Phil. 429.
  Maine.

†orthogonia *Morr.*, P. B. S. N. H. 239, 1876.
  Nebraska.
brocha *Morr*, P. A. N. S. Phil. 56, 1875.
  Colorado; Neb.; Nev.
Morrisoniana *Riley*.
  Missouri.
gladiaria *Morr.*, P. S. N. S. P. 59, 1875.
  Texas; Kansas.

N. B.—My specimens are of a smaller species than *Morrisoniana*, of which latter Professor Riley has sent me types; the hind wings are paler; otherwise the species are very similar. There is some doubt whether this identification is correct, but I believe I saw this species among Mr. Norman's collections in Canada. I cannot understand why Mr. Morrison has not compared the two.

†acclivis *Morr.*, Ann. N. Y. L. N. H. 93, 1875.
  "New York."
venerabilis *Walk.*, C. B. M. Noct. 328, ♂; ♀ *incallida* Walk., 330.
  Can.; Eastern and Middle States.
vancouverensis *Gr.*, Bull. B. S. N. S. 1, 134, pl. 4. fig. 4.
  Vancouver.
stigmosa *Morr.*
  Eastern and Middle States.

N. B.—Allied to *volubilis*, but of a more grayish faded brown; the hind wings darker.

volubilis *Harvey*, Bull. B. S. N. S. 2, 118.
  Eastern and Middle States.
gravis *Gr.*, Bull. B. S. N. S. 2, 155.
  California.
vapularis *Gr.*, Bull. B. S. N. S. 3, 81.
  California.
æneipennis *Gr.*, Bull. B. S. N. S. 3, 81.
  California.
opaca *Harvey*, Bull. B. S. N. S. 3, 72, pl. 3, fig. 1.
  Texas.
rudens *Harvey*, Bull. B. S. N. S. 2, 271.
†segetum *S. V.*, 81; Speyer, S. E. Z. 135.
  "Mass."
annexa *Treits.*, 1, 154; Guen., Noct. 1, 268.
  Middle, South., and Western States.
malefida *Guen.*, Noct. 1, 267.
  Southern States.
ypsilon *Rott.*, Nat. 41, 141; *suffusa* S. V.; *telifera* Harr.
  Europe; North Am.
sancia *Hübn.*, 378; *inermis* Harr. *Ortonii* Pack.
  Europe; North and South Am.

texana *Gr.*, P. E. S. P. 2, 273, 1863, pl. 6, fig. 2.
Texas; Colorado.
pyrophiloides *Harvey*, Can. E. 8, 37.
California.
trabalis *Gr.*, Can. Ent. 9, 198.
Middle and Eastern States.
pressa *Gr.*, T. Am. E. S. 90, 1874.
Western, Middle, and Eastern States.
prasina *Fab.*, Maut. 169; Speyer, E. Z. 136.
Europe and Atlantic States; Can.
occulta *Linn.*, S. N. 4, 514.
Europe and Atlantic States; Can.
astricta *Morr.*, Proc. B. S. N. H. 135, 1874.
New York.
† præfixa *Morr.*, P. B. S. N. H. 117, 1875.
"Rocky Mountains."

§ ANYTUS *Gr.*

sculpta *Gr.*, Bull. B. S. N. S. 1, 114; N. Am. Ent. 1, 93.

§ AMMOCONIA *Led.*

sculptilis *Harvey*, Bull. B. S. N. S. 3, 73, pl. 3, fig. 2.
Texas.
chortalis *Harvey*, Bull. B. S. N. S. 3, 74, pl. 3, fig. 9.
Texas; Arizona; Colorado.
aratrix *Harvey*, Bull. B. S. N. S. 3, 74, pl. 3, fig. 8.
Texas; Arizona; Colorado.
parentalis *Gr.*, Am. Ent. 1, 44.
Colorado.
decipiens *Gr.*, Am. Ent. 1, 45.
Colorado.

§ PACHNOBIA *Guen.*

alaskæ *Gr.*, Bull. B. S. N. S. 3, 38, pl. 4, fig. 1.
Alaska.
carnea *Thunb.*, M. N. 72, fig. 1; Moeschl. W. E. M. 4, 163; *Agrotis scopulana* Morr.
Mt. Washington; Labr.; Lapland.
Orilliana *Gr.*, Can. Ent. 7, 154; *Agrotis claviformis* Morr., Proc. B. S. N. H. 115, Oct. 1875.

§ AGROTIPHILA *Gr.*

montana *Morr.*, Ann. N. Y. L. N. H. 94; Grote, id. 108, 1875.

N. B.—This form has ovate-narrowed eyes, differing in this respect strongly from *Agrotis*, and approaching the Heliothid group of the family, *Anarta*, etc. The ornamentation is like *Agrotis*, but not unlike *Anarta*. I have included it here, but unless we refer all the Noctuids with spinose tibiæ to *Agrotis*, it cannot remain united with that genus.

Art. VII.—On the Nimrávidæ and Canidæ of the Miocene Period.

By E. D. Cope.

In following the general series of the *Carnivora*, we pass, as in other orders, from the generalized to the specialized types. That we should begin with the *Procyonidæ* and their allies is indicated by all the characters to be especially considered in the case. They have five toes on all the feet, and are plantigrade, resembling in these points all primitive *Mammalia.*[*] They have the original number of molar teeth, seven on each side, and of these none are distinctly developed sectorials. The condyloid and carotid foramina are distinct, and there is a postglenoid foramen. If, starting from this point of departure, we arrange the succeeding families of *Carnivora* according to their resemblances and differences in these respects, we have a tolerably consecutive series of divisions.

Passing at present over the families *Mustelidæ*, *Viverridæ*, *Cryptoproctidæ*, and others with five toes on all the feet, we reach those in which the hind foot has lost a digit, leaving the number 5–4. These are the *Protelidæ*, *Canidæ*, and *Felidæ*. We can take but one step further in this order; that is to those species where the anterior foot has also lost a toe, which constitute the family *Hyænidæ*. The toes are therefore, here, 4–4. For the well-marked characters of the three families mentioned just before, I refer to another page, and proceed to define briefly the division which has been heretofore termed the *Felidæ*. In doing so I am compelled to omit several of the characters generally employed to define that family, since I have found them to be wanting from various extinct genera. The only comprehensive definition which I can give is the following:

Digits 5–4; sectorial teeth well developed in both jaws; not more than one true molar tooth in the upper nor more than two true molar teeth in the lower jaw. Glenoid cavity grasping mandibular condyle anteriorly as well as posteriorly.

Professor Gill, who has devoted much attention to the definition of the families of the *Mammalia*,[†] gives the following skeletal characters in his diagnosis of the *Felidæ*, and of the three comprehensive divisions within which he places it: "I. Skull with the paroccipital process applied closely to the auditory bulla; the mastoid process small or obsolete; external auditory meatus very short or imperfect. Div. A. Carotid canal minute and superficial or obsolete; condyloid foramen and foramen lacerum posticum debouching into a common fossa; glenoid foramen minute or null. Os penis rudimentary. Subdiv. 1. Otic bulla divided by a septum into posterior and anterior chambers, communicating by a narrow aperture (Flower). Subdiv. *a*. Skull with no alisphenoid canal." All of the parts above mentioned I have found to be important in the definition of the natural divisions of the *Carnivora*, excepting those derived from the paroccipital and mastoid processes. But their condition in the extinct *Carnivora* which have been hitherto arranged with the *Felidæ*, and which resemble them very much in superficial characters, does not coincide with Professor Gill's definition. Thus, in the various American genera which are allied to *Drepanodon*, the carotid canal is distinct from the *foramen lacerum posterius*, and the condyloid foramen is also separated from it by quite a space. These are characters which belong to most of the *Carnivora* with five digits on all the feet. Further, the postglenoid and postparietal foramina are present; also characters of the lowest *Carnivora*, as the bears and certain extinct dogs. Then, there is an alisphenoid canal, which is also found in bears, dogs, and the cat-like *Cryptoprocta*. I cannot demonstrate that the otic bulla is divided, as the above diagnosis requires, in any of the fossil species. I have verified these characters on species of the following genera, of which I have well-preserved skulls: *Archælurus*, *Nimravus*, *Dinictis*, *Pogonodon* (except those of the basal axis of the skull), and *Hoplophoneus*. Three genera as yet only found in Europe are similar in general characters, and probably agree with them. I allude to *Proælurus* Filh., *Ælurogale* Filh., and *Eusmilus* Gerv. On the other hand, the genus *Smilodon*, which includes the American saber-tooths of Pliocene age, agrees with the true cats in the points in question; *i. e.*, the alisphenoid, postglenoid, and postparietal foramina are wanting, the carotid foramen is either internal or wanting, and the condylar enters the jugular foramen at its mouth. This surprising condition of affairs makes it important to learn the characters to be found in the species of the longest-known genus, *Drepanodon*, of the European beds. But although there are several good crania in European museums, I can find no description of their minute characters, and no mention made of their foramina. The probabilities are, on various grounds, that this genus agrees with *Smilodon* in the latter characters. The reasons in favor of this supposition are the agreement in special dental characters, and the Pliocene age of the typical species, *D. cultridens*. Whether the middle Miocene species of Sansan and Epplesheim agree with this one in structure, is of course uncertain.

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[*] See Homologies and Origin of Types of Molar Teeth of Mammalia Educabilia, Journal Academy Phila. 1874, March.

[†] Arrangement of the Families of Mammals, Smithson. Miscell. Coll. 230, 1872, p. 56.

Seven, and perhaps eight, genera, then, constitute a group to be distinguished from the true *Felidæ*, and, as it appears to me, as a distinct family. Should we ignore the characters adduced in this instance, we abandon at the same time the definitions of several of the other families of the order, and in fact throw the system into confusion. I have proposed to call this family the *Nimravidæ*, and have contrasted it with the *Felidæ* in the following definition. Both are included in the division already defined on a preceding page.

No distinct carotid foramen nor alisphenoid canal; condylar foramen entering the foramen lacerum posterius. No postparietal and generally no postglenoid foramina .... *Felidæ*.

Carotid and condylar foramina entirely distinct from the foramen lacerum posturius; an alisphenoid canal, and postglenoid and postparietal foramina .... *Nimravidæ*.

NIMRAVIDÆ.

The dental characters of the *Nimravidæ* are in general, those of the *Felidæ*, the higher genera having the same dental formula. Descending the scale, the number of molar teeth increases at both ends of the series in the lower jaw, and anteriorly only in the upper, but the number of the true molars never exceeds $\frac{1}{2}$. The following table gives the definitions of the genera. I am unfortunately ignorant of the characters of the foramina in *Proælurus* and *Pseudælurus*, as well as in *Ælurogale* and *Eusmilus*.

I. Lateral and anterior faces of mandible continuous; no inferior flange.
  a. Inferior sectorial with a heel; canines smooth.
    Molars $\frac{4}{4}$ $\frac{1}{2}$; inferior sectorial with interior tubercle .... *Proælurus*.
    Molars $\frac{3}{3}$ $\frac{1}{1}$; inferior sectorial without interior tubercle............ *Pseudælurus*.
II. Lateral and anterior faces of mandible separated by a vertical angle; no inferior flange; incisors obspatulate.
  a. No anterior basal lobe of superior sectorial; inferior sectorial with a heel (and no internal tubercle); incisors truncate.
    Molars $\frac{4}{3}$ $\frac{1}{2}$; canine smooth.. *Archælurus*.
    Molars $\frac{3}{3}$ $\frac{1}{2}$; canine denticulate .... *Ælurogale*.
    Molars $\frac{3}{3}$ $\frac{1}{2}$; canine denticulate... *Nimravus*.
III. Lateral and anterior faces of mandible separated by a vertical angle; an inferior flange; incisors conic; canines denticulate.*
  a. No anterior basal lobe of superior sectorial;† inferior sectorial with a heel; no posterior lobes of the crowns of the premolars.
    Molars $\frac{3}{3}$ $\frac{1}{2}$ .... *Dinictis*.
    Molars $\frac{3}{3}$ $\frac{1}{1}$ .... *Pogonodon*.
    Molars $\frac{2-3}{2}$ $\frac{1}{1}$ .... *Hoplophoneus*.
    •Molars $\frac{?}{1}$ $\frac{?}{1}$.. *Eusmilus*.

It is readily perceived that the genera above enumerated form an unusually simple series, representing stages in the following modifications of parts: (1) In the reduced number of molar teeth; (2) in the

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[*] Gervais's figures of the canines of *Eusmilus bidentatus* represent no denticulations, but the figure is not clear.

[†] Rudimental in *Hoplophoneus*.

enlarged size of the superior canine teeth; (3) in the diminished size of the inferior canine teeth; (4) in the conic form of the crowns of the incisors; (5) in the addition of a cutting lobe to the anterior base of the superior sectorial tooth; (6) in the obliteration of the inner tubercle of the lower sectorial, and (7) in the extinction of the heel of the same; (8) in the development of an inferior flange and latero-anterior angle of the front of the ramus of the lower jaw; (9) in the development of cutting lobes on the posterior borders of the larger premolar teeth.

(1) The reduction in the number of molar teeth. The dental formula of *Procælurus* is that of some *Viverridæ* and *Canidæ*, and the reduction from this point to the end of the series is obvious. In *Eusmilus*, as in *Smilodon*, the number of molars is less by one in the inferior series than in *Lynx* and *Neofelis*, where the formula is the smallest known among *Felidæ* proper, viz: $\frac{2}{2}\ \frac{1}{1}$. (2) The enlarged size of the superior canine teeth. In *Procælurus* and *Pseudælurus* the canines of both jaws are developed, as in recent *Felidæ*. In *Archælurus* the superior is the larger, but does not, relatively to the molars, exceed that of *Felis*. It is rather compressed in form and has a sharp cutting edge posteriorly. In *Nimravus* the superior canine begins to have the enlarged size of the saber-tooths, but its form is peculiar in the *N. gomphodus*, being spike-shaped rather than saber-shaped. We find the true saber shape first in *Dinictis*, where it is compressed, and with a denticulate cutting edge on both front and rear. In *Pogonodon* it has reached a very large size, and it does not display much increase in this respect until we reach the last genus of the series, *Eusmilus*, where its proportions are enormous, almost as large as in the feline genus *Smilodon*, where they appear to have been an inconvenience to the animal. (3) The diminished size of the inferior canines becomes evident in the lower genera of the third division (supra) of the *Nimravidæ*, but is most decided in the highest genera, *Hoplophoneus* and *Eusmilus*. (4) The incisor teeth have the usual obspatulate or obovate outline in the genera of the first and second divisions of the family, including *Nimravus*. They are conic in the true saber-tooths with flared lower jaw, beginning with *Dinictis* and ending with *Eusmilus*. (5, 6, and 7) The structure of the sectorials. The presence of a heel and an inner tubercle of the lower sectorial are well-known characters of a majority of the *Carnivora*. In only the most highly organized genera are they wanting, and among them are included all those of the *Felidæ* that still exist. In the *Nimravidæ* the inferior genera have both in a reduced degree, and they soon disappear as we ascend the scale. Thus, the inner tubercle is only present in the species of *Procælurus*, *Dinictis*, and *Hoplophoneus*. The heel, on the other hand, remains throughout the entire family. The anterior basal lobe of the superior sectorial has the same history, its absence being characteristic of the inferior *Carnivora*, and of all the genera of *Nimravidæ* except *Hoplophoneus*, where it is rudimental. It is well developed in *Drepanodon* as in recent *Felidæ*, and is sometimes double in *Smilodon*. (8) The

development of the inferior flange and latero-anterior angle of the mandibular ramus. There is a successive advance in the development of these characters, beginning with the second group, for in the first they are wanting. The latero-anterior angle is developed in *Archælurus* and allied genera, and is merely continued on the inferior border of the ramus. In the third group it is much more acute, and is deflected downwards, forming the well-known flange of the saber-tooths. It is longest in the *Eusmilus bidentatus* Filh. (9) The highest genera of *Nimravidæ*, e. g. *Hoplophoneus*, differ from the true *Felidæ* in the absence of the cutting lobes on the posterior edges of the crowns of the larger premolar teeth. But, according to Filhol, these lobes are present in the generalized genera *Proælurus* and *Pseudælurus*, which are thus brought into a relation with the *Felidæ* not possessed by other *Nimravidæ*.

A characteristic perfection of the *Felidæ* is seen in the genus *Smilodon;* that is, the vertical direction of the ungual phalanges, by which the claws become retractile. This is well displayed by the two splendid specimens of *Smilodon necator* from Buenos Ayres, which have been preserved.* Unfortunately, these phalanges have not yet been described in any species of the *Nimravidæ*, and it is not yet certain what their structure really was. Among the true *Felidæ* the genus *Cynælurus* displays a less degree of development in this respect than the other genera, the ungual phalanges lacking the proximal process below the articular facet. Such a condition is to be looked for among the less perfect genera of *Nimravidæ*.

The succesion of genera above pointed out coincides with the order of geologic time very nearly. Those belonging to groups first and second belong to the Lower and Middle Miocene, except *Ælurogale*, which is perhaps Upper Eocene, and *Pseudælurus*, which is Middle Miocene. The genera of the first group of division third have the same Lower Miocene age, except *Eusmilus*, which has been found in the same formatation (Phosphorites) as the *Ælurogale*. *Drepanodon* is Upper Miocene, and *Smilodon* is Pliocene.

The relations of these genera are very close, as they differ in many cases by the addition or subtraction of a single tooth from each dental series. These characters are not even always constant in the same species, so that the evidence of descent, so far as the genera are concerned, is conclusive. No fuller genealogical series exists than that which I have discovered among the extinct cats.

As to the phylogeny of this family, there are flesh-eaters of the Eocene period which may well have been the ancestors of both the *Nimravidæ* and *Felidæ*.† I have suggested that this position is most appropriately held by the *Oxyænidæ*, a family of several genera, which included the most formidable, rapacious mammals of that early period in both continents.

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* See American Naturalist, December, 1880, fig. 12.

† See On the Genera of the *Creodonta*, by E. D. Cope, Proceed. Amer. Philos. Soc. July, 1880.

The interval between them and the *Nimravidæ* is, however, great, for in the *Oxyænidæ*, when there is a superior sectorial tooth, the first true molar in the upper jaw is utilized instead of the last premolar, and the second true molar below is a sectorial as well as the first. Several intervening forms must yet be found to complete the connection, if it have ever existed. It is, however, very likely that the true *Felidæ* were derived from the genus *Proælurus*, through *Pseudælurus*, if indeed these two genera be not the primitive members of that family, for, as above remarked, the evidence of their possession of the characters of the *Nimravidæ* has not yet been obtained. There can be no reasonable doubt that the genera *Drepanodon* and *Smilodon* in the *Felidæ* are the descendants of *Hoplophoneus* and allied genera. In fact, the *Nimravidæ* and *Felidæ* are "homologous groups", having corresponding terms in the manner I foreshadowed as a general principle in 1868 (Origin of Genera).

In looking for causes in explanation of the modifications of structure cited, one can easily discover that there is a close relation between the arrangement of the teeth and the mechanical laws involved in the performance of their function, that of seizing an active prey and of cutting up their carcasses into pieces suitable for swallowing. It is obvious that in the latter case the flesh-teeth bear the resistance and the masseter muscle is the power, and that the nearer these parts are together the better is the function performed. As a matter of fact, the sectorial teeth in modern *Carnivora* are placed exactly at the angle of the mouth, which is nearly the front border of the masseter muscle.

Both the muscle and the teeth have, however, moved forwards in connection with the shortening of the jaw behind. This has been due to the necessity of bringing the power (masseter) nearer to another point of resistance, viz, the canine teeth. In the early carnivores (as *Hyænodontidæ*) the long jaws supported more numerous teeth $\left(\frac{4-3}{4-3}\right)$ than in any modern families, and the fissure of the mouth was probably very wide. The canine teeth were evidently very ineffective weapons. The animals probably only snapped with their jaws, and did not attempt to lacerate or hold on, as do the cats. The dogs of to-day are long-jawed, and they snap in a manner quite distinct from anything seen among the cats. The only dogs that hold on are the short-jawed bulldogs.

So in the use of the canines, we have the ground of the shortening of the jaw behind and before, and the consequent change of structure, which resulted in the modern perfected *Felidæ*.

The following list shows the number and distribution of the species of the *Nimravidæ*. The position of a cross on a line indicates an intermediate geological position.

	Upper Eocene.	Lower Miocene.		Upper Miocene.		Pliocene.	
	Europe.	Europe.	America.	Europe.	America.	Asia, Europe.	America.
Proælurus julieni Filh		+					
Proælurus lemanensis Filh		+					
Pseudælurus hyænoides Blv			+				
Pseudælurus edwardsi Filh	+						
Pseudælurus intrepidus Leidy					+		
Pseudælurus sivalensis Lydd					+		
Archælurus debilis Cope			+				
Ælurogale intermedia Filh	+						
Ælurogale acutata Filh							
Nimravus gomphodus Cope			+				
Nimravus confertus Cope			+				
Dinictis felina Leidy			+				
Dinictis cyclops Cope			+				
Dinictis squalidens Cope			+				
Pogonodon platycopis Cope			+				
Pogonodon brachyops Cope			+				
Hoplophoneus oreodontis Cope			+				
Hoplophoneus primævus Leidy			+				
Hoplophoneus occidentalis Leidy			+				
Hoplophoneus cerebralis Cope			+				
Eusmilus bidentatus Filh	+						

DESCRIPTIONS OF NEW SPECIES.

NIMRAVUS GOMPHODUS sp. nov.

Nimravus brachyops Cope, Proceed. Academy Philad. 1879, p. 179, not *Machærodus brachyops* Cope, Proc. Am. Phil. Soc. 1878, p. 72.

This carnivore is represented by parts of three individuals; one of them by a nearly complete skull. The species is rather larger than the average *Uncia concolor*.

Measurements of skull.

	M.
Axial length from occipital condyles to premaxillary border	.206
Axial length from inion to premaxillary border	.220
Axial length from premaxillary border to canine tooth	.017
Axial length from premaxillary border to anterior border of superior sectorial	.066
Axial length from premaxillary border to posterior extremity of maxillary bone	.097
Axial length from premaxillary border to postglenoid process	.162
Length of nasal bone from nasal notch	.065
Length of sagittal crest from inion	.082
Width of premaxillary bone (greatest)	.019
Width of each nasal bone at middle	.008
Width of each frontal bone at middle of orbit	.028
Width of each frontal bone at postfrontal angles	.035
Width of skull at anterior part of zygoma	.096
Width of zygomata at temporal fossa	.111
Width of skull at meatus auditorius	.074
Width of skull between apices of paroccipital processes	.054
Width of occiput at middle	.044
Width of foramen magnum	.024

	M.
Elevation of occiput above foramen	.036
Width of chin at base	.022
Width of chin at summit	.028
Depth of chin	.040
Depth of ramus at diastema	.027
Depth of ramus below last premolar	.031
Length of ramus	.157
Elevation of condyle	.033
Elevation of coronoid process	.071
Length of superior canine	.045
Diameters of base of superior canine antero-posterior	.016
transverse	.008
Anteroposterior diameter at middle	.010
Distance from canine to third premolar	.016
Length of molars, including third premolar	.045
Length of base of third premolar	.018
Elevation of cusp of third premolar	.013
Length of base of sectorial	.025
Elevation of cusp of sectorial	.015
Width of tubercular	.009
Elevation of inferior canine	.024
Antero-posterior diameter of inferior canine at base	.012
Length of inferior diastema	.022
Length of inferior molar series	.063
Length of third premolar	.0175
Elevation of third premolar	.0175
Length of fourth premolar	.020
Elevation of fourth premolar	.015
Length of sectorial	.025
Elevation of median cusp of sectorial	.016

The characters of this species will be fully detailed in my final report to Dr. Hayden, now passing through the press.

From the John Day River, Oregon.

NIMRAVUS CONFERTUS sp. nov.

This species is as yet represented by a mandibular ramus only. It is one-third smaller than that of *N. gomphodus*.

The inferior border of the ramus is broken off, excepting for a space below the diastema. The general form is narrow, as in *N. gomphodus*, and there is a projecting ledge along the inner base of the sectorial similar to that seen in the latter species. The angle separating the side from the front of the ramus is rather stronger than in *N. gomphodus*, but there is no indication of an inferior flare. The diastema is shorter than in the typical species, its length equalling that of the base of the third (first) premolar; in *N. gomphodus* it is half as long again. The symphysis is correspondingly shorter, ceasing a little in advance of, and at the posterior border of, the inferior canine tooth, while in *N. gomphodus* it continues for one diameter of the canine behind its posterior border.

The crown of the inferior canine tooth is directed backwards, and its serrate cutting edge is presented almost entirely inwards. The interno-anterior face of the crown is flat, and has a low shoulder at the base. The molars have the proportions of those of *N. gomphodus*, differing only in their smaller size, which is very apparent, as can be seen by the measurements. The first (third) premolar is a little longer on the base than high, has no anterior tubercle, and has a short cutting basal heel. The fourth premolar has subequal anterior and posterior basal cutting lobes, and the base is longer than the elevation of the median cusp. The sectorial tooth has a short cutting heel, but no trace of inner tubercle. The anterior lobe is as long as the median, but not so high. It overlaps the fourth premolar as far as the base of the median cusp. No incisor teeth are preserved in the specimen. Tubercular small.

Measurements of skull.

	M.
Depth of ramus at diastema	.020
Depth of chin	.027
Elevation of inferior canine	.016
Diameter of inferior canine at base	.010
Length of inferior diastema	.014
Length of inferior molar series	.053
Length of third premolar	.014
Elevation of third premolar	.010
Length of fourth premolar	.016
Elevation of fourth premolar	.013
Length of sectorial	.022
Elevation of median cusp of sectorial	.015

One specimen, from the John Day Valley, Oregon, found in the Truckee formation, by J. R. Wortman.

COLOREODON RYDERANUS sp. nov.

Represented by a nearly complete skull, without lower jaw. These indicate the third and smallest species of the genus. The specimen belonged to an adult animal, as indicated by the condition of the last two molar teeth.

Besides the small size, two characters may be cited as distinguishing this species from those already known. First, the temporal ridges converge very gradually, so that the sagittal crest does not appear anterior to the line of the otic bullæ, posterior to which point the skull is broken above. Second, the face is constricted immediately posterior to the position of the fundus of the alveolus of the canine teeth. The position of this alveolus is prominent, and occupies the superior half of the maxillary bone, which is excavated beneath it. This excavation is bounded behind by the infraorbital foramen. The lachrymal bone presents an angle into the orbit. The latter is open posteriorly, but the opposing processes approach each other. The zygomata are slender. The enamel of the molars is slightly wrinkled.

Measurements of skull.

		M.
Total length from left side of inion to front of canine		.147
From same to end of maxillary bone		.075
From same to palatal notch		.087
Length of diastema		.011
Length of molar series		.069
Length of true molars		.035
Diameters of second true molar	antero-posterior	.013
	transverse	.015
Diameters of third true molar	antero-posterior	.015
	transverse	.019

The linear measurements of this skull are three-fourths that of *C. ferox*, and three-fifths that of *C. macrocephalus*.

Found by J. L. Wortman, on the John Day River, Oregon.

Dedicated to my friend John A. Ryder, of Philadelphia.

PALÆOCHŒRUS PLATYOPS sp. nov.

Established on a nearly complete skull, which lacks the muzzle anterior to the third premolar teeth, the lower jaw, and parts of the zygomata. The last superior molar is not protruded, and it is probable that the fourth deciduous premolar still remains in the jaw.

The size of this species exceeds that of any other member of the genus· The postorbital process is also more elongate, so as to inclose the orbit to a greater extent than is usual in *Palæochœrus*. The temporal ridges are strong, and rise into a convexity above the anterior part of the temporal fossa. From this point they converge gradually to form the sagittal crest, which has a truncate edge. Between the ridges the surface is concave, the basin widening forwards as far as a line passing through the posterior third of the orbits. The frontal bone rises steeply from the orbit to the edge of this basin, and is regularly convex in front of it. The profile descends forwards, so that the section at the infraorbital foramen is broadly convex, and not compressed, as in the species of *Palæochœrus* from the Truckee beds of Oregon. The emargination of the palate extends as far forwards as the line of the anterior border of the second true molar. The posterior border of the infraorbital foramen is above the middle of the anterior root of the fourth premolar. The postglenoid, mastoid, and postparietal foramina are present; the last named rather small and in the inferior part of the parietal bone.

The base of the fourth premolar is remarkably extended antero-posteriorly. Its crown has a posterior basal cingulum, and is in contact with those of the molars anterior and posterior to it. The crown of the first true molar is narrowed inwards, the anterior border being more oblique than the posterior. Both of these borders have a wide cingulum. There are two large external cusps, with antero-posterior continuous edges, two small median cusps, and a larger internal cusp. No internal or external cingula. The second true molar is also narrowed inwards, but less so than the first, and the posterior border is the only oblique one. There are wide posterior and anterior cingula, and five cusps arranged as in the first molar. The internal cusp is relatively larger in this tooth.

Measurements of skull.

		M.
Length from occipital condyles to anterior border of last premolar		.186
Length from occipital condyles to palatal edge		.135
Length from occipital condyles to line of anterior border of glenoid fossa		.051
Width of occiput above		.046
Width at posterior origin of zygomata		.071
Width between orbits (least)		.077
Width at middles of first molar teeth		.098
Width between first molar teeth		.040
Elevation of occiput, with condyles		.082
Elevation of muzzle at front of fourth premolar		.043
Diameters first molar	antero-posterior	.021
	transverse	.016
Diameters second molar	antero-posterior	.022
	transverse	.019

This species is easily distinguished from those which have been discovered heretofore, by its large size, by the peculiar form of its molar teeth, and by its flattened muzzle. The specimen above described was discovered by Capt. Emmett Crawford, Third Cavalry, U. S. A., on the upper waters of the Big Cheyenne River, Dakota, in a bed of the White River formation. It was presented to me by Dr. William H. Corbusieur, U. S. A., to whom my especial thanks are due.

PROTOLABIS PREHENSILIS sp. nov.

This camel is supposed to have existed on the evidence of portions of the mandibles of two individuals. These include the symphyseal portion, and one of them the ramus as far posteriorly as the first true molar, inclusive. These remains indicate a robust species of the size of the *Procamelus angustidens*, or between the *P. gracilis* and *P. robustus.*

The most marked peculiarities of this species are the following: The canine and first premolar are very robust, and the latter is one-rooted and with an oval section at the base like the canine. The second premolar is also one-rooted, while the third and fourth are two-rooted, and differ very little in size from each other. The first true molar is abruptly larger, although narrowed in front. The root of the second premolar is round and of robust proportions, its diameter being one-half linear that of the first. The roots of the incisors are robust, that of the first being rather larger than that of the third. The symphysis terminates a little behind the line of the first premolar. The mental foramen is unusually extended in the antero-posterior direction.

Measurements of skull.

		M.
Length of symphysis (No. 1)		.080
Length of bases of incisors and canine		.043
Diameters of canine	antero-posterior	.016
	transverse	.011

	M.
Diameters of premolar (I) antero-posterior	.014
Diameters of premolar (I) transverse	.009
Length of last three premolars on base (No. 2)	.034
Length of base of fourth premolar	.011
Length of base of first true molar	.019
Length of first diastema (No. 2)	.017
Length of second diastema (No. 1)	.026
Depth at second diastema (No. 1)	.033
Depth at first true molar	.048

The generic position of this species is uncertain. I place it provisionally in *Protolabis* on account of the large development of the inferior incisors. Its robust canine and first premolar, and small third and fourth premolar distinguish it from any of the species described.

Found by R. H. Hazard, in the Loup Fork beds of Southern Nebraska.

EUMYS LOCKINGTONIANUS sp. nov.

This rodent is represented by a nearly perfect skull, which is without lower jaw. Its specific characters separate it widely from the *E. elegans* Leidy and *E. nematodon* Cope. It is considerably larger than either, and the temporal ridges are very obsolete and do not unite posterior to the orbits, as in *E. elegans*, resembling in this respect the *E. nematodon*. The parietal region is wide and flat above. The interorbital region is only moderately contracted. The muzzle is rather short as compared with the total length of the skull. The interorbital region is gently convex above, and the top of the muzzle is flat. The zygoma is quite slender, and the otic bullæ are large and prominent. The notch of the palate extends as far forwards as the posterior part of the last superior molar. The infraorbital foramen is very large and round.

The anterior face of the superior incisor is nearly plane, and it is marked by a weak groove near the inner and a strong groove near the external border. In *E. elegans* this face is convex and without grooves. The molars are rather small for the size of the skull; their crowns are worn by use. The third is subround in section, and its diameter is about half that of the first; the latter has the anterior odd lobe quite small.

Measurements.

	M.
Total length of skull	.0380
Length (axial) to front of orbits	.0140
Length (axial) to palatal notch	.0190
Length (axial) to first molar	.0120
Width at otic bullæ	.0205
Width at middle of zygomata	.0220
Width of interorbital space	.0060
Width between first molars	.0055
Length of molar series	.0070
Length of first molar	.0030
Width of superior incisor	.0015

This species is dedicated to my friend W. N. Lockington, the well-known naturalist of San Francisco.

SCIURUS BALLOVIANUS sp. nov.

This squirrel is the second species of its genus supposed to occur in the Truckee beds of Oregon, and the third *Sciurus* obtained thus far from the Lower Miocene or Oligocene of the West. The typical specimen fortunately includes the cranium, with both rami of the mandible, so that its reference to the genus *Sciurus* rather than to *Gymnoptychus* is assured. Like the latter genus, the infraorbital foramen is reduced to a slit, but, unlike it, there is but one internal tubercle of the crowns of the superior molars instead of two.

The skull is flat above, and the interorbital space is also flat, and is remarkably wide. Temporal ridges none. Muzzle short and narrow. Palate wide, its posterior notch extending as far forwards as the last superior molar. The ascending ramus of the mandible originates opposite the anterior part of the last inferior molar. The massateric fossa extends to opposite the anterior border of the second inferior molar. The mental foramen is near the superior border of the posterior part of the diastema. The second and third superior molars, the only ones preserved, have two cross-crests and a strong anterior cingulum. The external extremities of the cross-crests are little elevated, and there are no other cingula. The inferior molars have basin-shaped grinding faces, with a lobe at each angle. There is a small tubercle between the lobes of the inner and outer pairs. The incisors of both jaws are much compressed, strongly convex in front, and, in the lower jaw at least, without sculpture.

Measurements.

		M.
Length of skull to orbit		.0090
Width between orbits		.0090
Width of muzzle		.0047
Width between last molars		.0040
Length of superior dental series		.0054
Diameters of second molar	antero-posterior	.0015
	transverse	.0016
Width of superior incisor		.0013
Length of mandibular ramus		.0150
Elevation of ramus at coronoid		.0080
Length of diastema		.0030
Length of inferior dental series		.0070
Depth of ramus at second molar		.0045

This species is much smaller than the *Sciurus vortmani*, from the same horizon of Oregon. The type specimen was discovered by Mr. L. S. Davis, of Mr. Wortman's party. The name is given in honor of Mr. M. H. Ballou, of Chicago, a naturalist and journalist.

CANIDÆ.

Species of this family were very abundant during the Miocene period in North America as in Europe. Those of the Lower and Middle Miocene epochs belong to genera allied to, but distinct from, *Canis*; while those of the Upper Miocene (Loup Fork) and later horizons, pertain to the latter genus, with few exceptions. The characters of the genera are as follows:

I. Molar formula $\frac{4}{4}$ $\frac{3}{3}$.
  Humerus with epitrochlear foramen .... *Amphicyon*.
II. Molar formula $\frac{4}{4}$ $\frac{2}{3}$.
  Humerus with epitrochlear foramen.
    Inferior sectorial heel trenchant .... *Temnocyon*.
    Inferior sectorial heel basin-shaped .... *Galecynus*.
  Humerus without epitrochlear foramen.
    Inferior sectorial heel basin-shaped .... *Canis*.
III. Molar formula $\frac{3}{3}$ $\frac{1}{2}$.
  Heel of inferior sectorial trenchant .... *Enhydrocyon*.
IV. Molar formula $\frac{4}{4}$ $\frac{1}{2}$.
  Heel of inferior molar basin-shaped .... *Icticyon*.
V. Molar formula $\frac{4}{3}$ $\frac{1}{1}$.
  First inferior molar two-rooted .... *Hyænocyon*.

To these genera I refer nineteen species of the American Miocenes.

AMPHICYON Lartet.

Bulletin Société Géologique de la France, 1836, vii, 217–220; Blainville, Comptes-Rendus, 1837, v, 434; L'Institut, 1837, v, 18–19; Blainville, Osteographie, ix, Subursus, 78–96.

Dental formula: I. $\frac{3}{3}$; C. $\frac{1}{1}$; Pm. $\frac{4}{4}$; M. $\frac{3}{3}$. The true molars of the superior series all tubercular; the last two of the inferior series also tubercular. First inferior true molar a sectorial, with an internal tubercle and a heel with a superior groove, bounded by raised borders. Humerus with an epitrochlear arterial foramen.

Much is yet to be desired in the elucidation of the characters of this genus, especially of the American forms, which are less abundant and of smaller size than those of Europe. The typical species, *Amphicyon major* Blv. was the largest, equalling a bear in size. It is derived from the Miocene of Sansan, and a smaller form of it is found, according to Pomel, at San Gerand-le-Puy. Other species are derived from the latter locality, and all are typical of the Miocene formation in Europe. In the "Mio-pliocene" of India a single species has been discovered, the *A. palæindicus* of Lydekker. Three species occur in the Lower and Middle Miocene of North America, the largest of which about equals the wolf in size. On account of the large development of the inferior tubercular teeth, I have suspected that the *Canis ursinus* Cope, from the Loup Fork group of New Mexico, would prove to be an *Amphicyon*. If so, it is the only representative of this genus in our Upper Miocene.

The three American species differ as follows: The *A. cuspigerus* is small, not exceeding the kit-fox in dimensions. The *A. hartshornianus* is about the size of the coyote, and has rather small tubercular molars, especially of the lower series. The *A. vetus* is a little larger, but has the tubercular molars disproportionately larger than those of the *A. hartshornianus*.

TEMNOCYON Cope.

Paleontological Bulletin, No. 30, p. 6, December 3, 1878; Proceedings American Philosophical Society, 1878, p. 68.

Dental formula: I. $\frac{3}{3}$; C. $\frac{1}{1}$; Pm. $\frac{4}{4}$; M. $\frac{2}{3}$. Two molars in each jaw tubercular. Inferior sectorial with well-developed heel, which is keeled with a cutting edge above. An internal tubercle of the same. A postglenoid, but no postparietal foramen. Humerus with an epitrochlear arterial foramen.

The characters on which I rely at present for the discrimination of this genus from *Canis* are two. The first is the presence of a cutting edge on the superior face of the heel of the inferior sectorial, in place of a double row of tubercles surrounding a basin. When well developed, these characters present a broad contrast, but indications of transitional forms are not wanting. Thus, in some extinct *Canes* the internal crest of the heel is less elevated than the external, which is the homologue of the single crest of *Temnocyon*, and in some specimens of *Temnocyon coryphæus* there is a cingulum on the inner side of the median keel, which represents the internal crest of *Canis*. Secondly, the epitrochlear foramen of the humerus, a character common to all of our Lower Miocene *Canidæ* yet known.

The keel of the sectorial, which defines this genus, is simply a repetition on that tooth of the heel which belongs to the posterior premolar teeth of many *Carnivora*. It finds resemblances in such Eocene forms as *Mesonyx* and *Palæonyctis*. Among recent *Canidæ* it is apparently unknown, and is very rare in other groups. The *Cynodictis crassirostris* Filhol, from the French Phosphorites, strongly resembles the species of *Temnocyon* in generic characters.

Three species of the genus are known to me. They may be distinguished as follows. A fourth species, *T. josephi*, is provisionally placed with these:

I. First superior tubercular molar with a wide median fossa, bounded within by a tubercle.
  Length of superior molar series from canine, .070; of true molars, .0215. *T. altigenis.*
  Length of molar series from canine, .067; of true molars, .014. *T. wallovianus* sp. nov.
II. First superior tubercular molar with narrower basin, bounded within by a V-shaped crest.
  Length of dental series from canine, .055; of true molars, .014 .... *T. coryphæus.*
  Length of dental series from canine, .051; of true molars, .013; muzzle narrow, zygomas wide .... *T. josephi* sp. nov.

All of the above species have been derived from the Truckee Miocene beds of Oregon. I, however, anticipate the discovery of these or other species of the genus in the White River beds of Dakota and Colorado.

GALECYNUS Owen.

Quarterly Journal Geological Society London, 1847, iii, 54–60.—"*Cynodon* Aymard, Annales Société du Puy, 1848, xii, p. 244.—*Cynodictis* Bravard et Pomel, Notice sur les Ossemens Fossiles de la Debruge, 1850, p. 5.—*Cyotherium* Aymard, Ann. Soc. d'Agric. du Puy, 1850, xiv, p. 115"; Bronn.

Dental formula: I. $\frac{3}{3}$; C. $\frac{1}{1}$; Pm. $\frac{4}{4}$; M. $\frac{2}{3}$. Inferior sectorial with internal tubercle, and with a heel with raised or tubercular internal and external borders. First premolar in both jaws one-rooted. A postglenoid but no postparietal foramen. Humerus with an epitrochlear arterial foramen.

This genus, which is abundantly represented by species and individuals, existed during the Upper Eocene epoch in Europe (in the Phosphorites), and also during the White River or Oligocene in North America. As the structure of the feet of the numerous species from these epochs is not yet known, and, therefore, some doubt as to their correct generic reference may still exist, I only regard the genus as a certain inhabitant of North America during the Truckee or Middle Miocene epoch. This is indicated by the *Galecynus geismarianus*, where the number of the toes on the posterior foot has been ascertained.

All the species of the genus from Eocene and Lower Miocene beds, as well as most of those of the Loup Fork epoch, are characterized by the relatively small size of their sectorial teeth. In this they resemble the *Amphicyons*, *Temnocyons*, and other forms of *Canidæ* of the same period, and differ from such true *Canes* as *C. ursinus*, *C. sævus*, and *C. haydeni*, which display the enlarged sectorial teeth of the existing species of the genus. Of course there is every gradation in this respect between the two types. In the older species the internal tubercle of the inferior sectiorial tooth is more largely developed than in the later ones, thus approaching some of the species of *Viverridæ*, where it is still more largely developed. As in other characters, there are gradations in this also, so that neither in it nor in the relative size of the sectorials do I find ground for the separation of the species in question from the genus *Canis*, as has been proposed in the case of some of the species in Europe. Through the kindness of M. Filhol, I possess jaws of a number of the species found by himself and others in the Phosphorites of Central France, including the *Canis velaunus*, the type of the genus *Cynodon* of Aymard. These agree very nearly with the species of dogs from the American Miocene beds as to generic characters. Professor Owen, in the paper above cited, proposed to distinguish the genus *Galecynus* on account of the greater length of the pollex as compared with that found in the existing species of *Canis*. This character appears to me to be of an unsatisfactory nature, owing to the fact that gradations in the length of a digit are difficult to express with precision in other than a specific sense; and the gradations may certainly be expected to occur.

I find in the *G. geismarianus* a character which separates the genus from *Canis*, viz, the presence of the epitrochlear foramen of the humerus. In this point it agrees with *Amphicyon* and *Temnocyon*. I arrange cotemporary and generally similar species under the same generic head, as the most reasonable course in the absence of direct evidence.

The American species of *Galecynus*, then, may be arranged as follows:

I. Smaller species with little or no sagittal crest.
  * Temporal ridges uniting close behind orbits; otic bullæ small.
    Small; no external ridge on inferior sectorial .... *G. gregarius* Cope.
  ** Temporal ridges uniting early; otic bullæ large.
    Larger; no external ridge on inferior sectorial; teeth robust. *G. geismarianus* Cope.
    Smaller; an external ridge on lower sectorial; teeth more robust. *G. latidens* Cope sp. nov.
  ** Temporal ridges not uniting anteriorly; otic bullæ large.
    Least; muzzle narrow; superior tuberculars wide; no external ridge on inferior sectorial .... *G. lemur* Cope.

Hyænocyon Cope.

Paleontological Bulletin, No. 31, 1879, p. 3 (Dec. 24); Proceedings American Philosophical Society, 1879, p. 372.

This genus rests on the characters furnished by a single species, which is represented by but few remains. Its family position is doubtful, and my reference of it to the *Canidæ* is only provisional. It may, so far as the evidence goes, be a member of the *Mustilidæ* or even of the *Felidæ*.

Dental formula: I. $\frac{3}{3}$; C. $\frac{1}{1}$; Pm. $\frac{4}{3}$; M. $\frac{1}{1}$. Last superior molar rather narrow, transverse. Inferior premolars all two-rooted, and with well-developed posterior cutting lobe. Inferior sectorial large, with heel. Probably no inferior tubercular tooth.

The characters above given agree with those of *Icticyon* in the superior series, but differ in the inferior in the absence of the Pm. I. and the M. II.

The only known species is the *Hyænocyon basilatus* (*Enhydrocyon basilatus* Cope olim.), from the Truckee beds of Oregon.

Icticyon Lund.

Kongl. Danske Vidensk. Selsk. Afhandl. naturvidensk. og math. Classe, ix, Deel, 1842 (October, 1841) fide Burmeister; Van der Hoeven Wissen. en natuurk. Verh. der Koninkl. Akademie Amsterdam, Deel iii; Burmeister Erlauterungen zur Naturgesch. Brasiliens, 1856, 2.—*Cynalicus* Gray, Ann. Magaz. Nat. Hist. London, xvii, no. 112, 293.—*Melictis* Schinz. Revue et Magaz. de Zoologie, 1848, 176, fide Burmeister.

The dental formula is, I, $\frac{3}{3}$; C. $\frac{1}{2}$; Pm. $\frac{4}{4}$; M. $\frac{1}{2}$. The single superior tubercular molar is similar in general to that of other *Canidæ*. The inferior sectiorial has an internal cusp and posterior heel, the latter with a low cutting edge on one side. Inferior tubercular well developed. One existing and one extinct species have been found in Brazil, the latter in the caves. I described a species from the Miocene which I cannot separate from them generically. This is the *Icticyon crassivultus* Cope (Proceedings Academy Philadelphia, 1879, p. 190).

Art. VIII.—On the Vertebrata of the Wind River Eocene Beds of Wyoming.

By E. D. Cope.

The Wind River, the principal source of the Big Horn, rises in the Wind River Mountains, in Western Central Wyoming, and flows through a bad-land region for a hundred miles. This region was explored by Dr. F. V. Hayden in 1858, who makes the following observations respecting it (American Naturalist, 1878, p. 831):

> Along the east side of the Wind River Mountains, and filling up the Upper Wind River Valley, is a great thickness of Tertiary strata that has been weathered into very remarkable forms, and which are known in the West as "bad lands". The strata are most beautifully variegated with various shades of pink or brick-red color, so that they sometimes remind one of the Jura-Trias red beds. This formation was described by me in 1859 in detail, and named the Wind River group. It covers a broad area in this region, extending from the source of Wind River to the Sweet Water Mountains, south, more than one hundred miles, and west an average width of one to five miles. The aggregate thickness of this group cannot be less than 5,000 feet. On the west side of the Wind River Mountains no formations older than the Wasatch group are found. This group rests, doubtless, on the Archæan nucleus, inclining at the base 5 to 10 degrees. All the older sedimentary rocks have been entirely swept away from the granites for a distance of 100 miles; while on the opposite or east side, all the corresponding strata are visible, from the Silurian to the Cretaceous The Wasatch beds cover a large part of the Green River Valley, especially about its sources.

During the past summer I sent a party into the Wind River Basin, under direction of Mr. J. L. Wortman, already well known from his numerous important paleontological discoveries in Oregon. This gentleman made a thorough exploration of the bad lands, and probably obtained all the fossils found on the surface in the region. The following list of forty-five species shows that the collection embraces nearly all of the characteristic types of the American Eocene, and that twenty-six species are new to science. Among the most remarkable of these I may cite the large flesh-eater *Protopsalis tigrinus*, the largest of the Eocene period yet known, and the Amblypod, *Bathyopsis fissidens*, an important addition to the forms of that peculiar order.

Mr. Wortman's explorations were not accomplished without accident, he having lost most of his outfit on his first crossing of the Wind River. The bad lands form a most forbidding region, mostly waterless, and at an elevation which is unfavorable to the sparse vegetation which is permitted by the dryness of the climate.

According to Leidy's measurements, this species is about the size of his *M. vorax* of the Bridger formation. That species has, like the two others of that horizon, a second tubercular tooth with only one root.

Measurements.

	M.
Length of dental line posterior to canines	.0440
Length of premolar series	.0250
Length of base of fourth premolar	.0065
Length of base of sectorial	.0085
Length of base of first tubercular	.0060
Length of base of second tubercular	.0040
Depth of ramus at second premolar	.0150
Depth of ramus at second true molar	.0100

This species was probably about the size of the gray fox.

23. MIACIS BREVIROSTRIS sp. nov.

This species differs from those of the Bridger epoch in the same way that *M. canavus* does, *i. e.*, in the biadicate last inferior molar. Its dimensions are intermediate between those of *M. edax* and *M. vorax*, hence a little smaller than those of the *M. canavus*. This difference is partially seen in the shortening of the premolar series of teeth. They are closer together than in the *M. canavus*, and the roots are larger. The sectorial tooth is shorter. The fourth premolar has a low anterior basal cingulum; the posterior part of the crown is robust. The first tubercular molar is wide, and consists of a basin-shaped heel and a short anterior portion which is more elevated. The latter consists of two cusps, which are connected by an anteriorly convex ledge, but there is no third anterior tubercle as in *M. parvivorus*. The ramus is quite robust, and the basis of the canine tooth is unusually large. Mental foramina are below the anterior parts of the second and fourth premolars, respectively. Last inferior molar small.

Measurements.

	M.
Length of molar series	.0380
Length of premolars	.0200
Length of base of fourth premolar	.0060
Length of base of sectorial	.0072
Length of base of first tubercular	.0048
Length of base of second tubercular	.0042
Depth of ramus at second premolar	.0140
Depth of ramus at second true molar	.0140

24. DIDYMICTIS ALTIDENS Cope.

American Naturalist, 1880, Oct. p. 746.

Represented by several specimens. The species is larger than the *D. protenus*, or about equal to the coyote; but the tubercular molar is relatively smaller, and has the three anterior cusps better developed. The heel of the tubercular sectorial is longer and the three cusps more elevated than in *D. protenus.* Diameters of latter tooth: Length anteroposteriorly, .015; length of heel, .006; elevation of external side of crown anteriorly, .015; width at same point, .009. Length of crown of tuberular, .009; width of same, .006; elevation anteriorly, .005.

25. DIDYMICTIS LEPTOMYLUS Cope.

American Naturalist, 1880, Dec. p. 908.

Represented by the posterior three inferior molars. These indicate a species of smaller size than the *D. protenus*, with the tubercular molar relatively narrower, and perhaps longer. The anterior part of the latter has the three cusps well defined and close together, and behind them is an oblique longitudinal cutting edge. The middle of the posterior margin rises into a tubercle. The anterior cusps of the tubercular sectorial are elevated; the heel has a strong external cutting edge and internal ledge. Length of tubercular sectorial, .009; width of same, .005; length of tubercular, .007; width of same in front,

26. DIDYMICTIS DAWKINSIANUS sp. nov.

This flesh-eater is represented by more or less imperfect mandibular rami of three individuals. The most complete of these lacks only the portions posterior to the coronoid process, and those anterior to the first premolar, and supports all the teeth excepting the first and second premolars. The premolars are all two-rooted excepting the first. The base of the fourth premolar is considerably longer than that of the third. Both of these teeth have a short posterior heel, and above it a cutting lobe. The fourth has a well-marked anterior basal tubercle. The heel of the sectorial is relatively short, and the anterior portion of the tooth elevated. The anterior and inner cusps are high, and about equal, but the external cusp is much higher. The external border of the heel is more elevated than the inner. The tubercular molar is elongate, and has a small triangular anterior portion somewhat elevated, in slight resemblance to the sectorial tooth. This portion consists of two opposite cusps and a lower one in front of the anterior inner, which connects with the external by an anterior ledge. The posterior portion has a tubercle on the external side, besides a posterior elevation. The ramus is rather slender, and the masseteric fossa is bounded by a prominent ridge in front, but fades out below.

The measurements show this to be the smallest species of the genus, being much less than the *D. leptomylus.*

Measurements.

	M.
Length of dental series, including first premolar	.0265
Length of premolar series	.0168
Length of base of fourth premolar	.0055
Length of base of sectorial	.0053
Width of base of sectorial at middle	.0035
Elevation of sectorial	.0055

	M.
Length of first true molar	.0044
Width of first true molar in front	.0028
Elevation of first true molar in front	.0025
Depth of ramus at second premolar	.0064
Depth of ramus at tubercular molar	.0070

This species is dedicated to my friend Prof. W. Boyd Dawkins, the distinguished geologist and paleontologist, of Manchester, England.

27. **STYPOLOPHUS STRENUUS** Cope.

Portions of two individuals, with lower jaws, etc.

28. **ICTOPS BICUSPIS** Cope.

Stypolophus bicuspis Cope, American Naturalist, 1880, Oct. p. 746.

The genus *Ictops* was determined by Leidy from a species, the *I. dakotensis* Leidy, from the White River formation. The animal now mentioned is identical with it in generic characters, so far as they are ascertained. The *I. dakotensis* is established on a specimen which does not contain all the teeth, but the parts preserved indicate that those which are wanting are like the corresponding parts of *Leptictis* Leidy and *Mesodectes* Cope, with which the present species also agrees. It is unexpected to identify a genus found on the White River horizon with one from the Wasatch. *Ictops* agrees very closely with *Didelphys*. The fourth superior premolar has an internal cusp, which is wanting in *Didelphys*, and the inferior border of the mandible is not inflected. There are also but three superior incisors on each side. Under these circumstances I prefer to refer this genus to the *Bunotheria* rather than to the *Marsupialia*, but whether its proper place is in the Creodont or Insectivorous subdivisions I cannot yet determine.

Char. specif.—Smaller than the *Stypolophus minor* Filh., and not very different in dimensions from the *Ictops dakotensis* Leidy. It is represented by a nearly complete skull, with entire dentition of both jaws. Premaxillary bones rather elongate; general form of skull that of a civet. Crowns of second and third superior premolars compressed, with a prominent cusp behind the principal one. First and second true molars with two distinct external cusps and a strong external basal cingulum. Inferior first premolar one-rooted, third with a posterior heel, and fourth with strong anterior and especially posterior heels. Heels of true molars well developed (last broken). Length of superior dental series to I. 1, .031; length of molar series, .020; length of true molars, .006; depth of mandible at second true molar, .007; depth at canine, .0035. The double-lobed third premolar and the smaller size distinguish this species from the *Stypolophi*.

29. **ICTOPS DIDELPHOIDES** sp. nov.

Established on a left mandibular ramus, which supports the last three molars. This demonstrates the former existence of a species of larger size than any of the *Leptictidæ* hitherto known. The general form of the inferior true molars is a good deal like that of *Stypholophus*, but they may be distinguished by three characters in which they at the same time, agree with the *Ictops bicuspis:* First, the elevated border of the heel, with a strong external cusp and weaker posterior and internal elevations; second, the small development of the anterior cusp; third, the posterior production of the heel of the third true molar, giving an indication of a fifth lobe. The external anterior cusp of the third molar is elevated; on the first molar it is less so, and the anterior cusp is small. The enamel is smooth, and there are no internal nor external cingula. The mandibular ramus is compressed and deep.

Measurements.

		M.
Length of bases of three true molars		.0165
Diameters of first true molar	anteroposterior	.0055
	transverse behind	.0038
Diameters of last true molar	anteroposterior	.0060
	transverse	.0050
Depth of ramus at anterior root of last true molar		.0095

The jaw fragment described indicates a skull about the size of that of the common opossum.

30. PROTOPSALIS TIGRINUS Cope.

American Naturalist, 1880, p. 745.

Char. gen.—Probably *Oxyænidæ*,* but as the type species is only known from two true molars and a canine of the inferior series, with bones of the skeleton, this point remains to be ascertained. Femur with a weak third trochanter. Inferior molars: one like those of *Oxyæna*, *i. e.*, with large heel and internal cusp; another, probably the last-larger, without internal tubercle, and with a rudimental heel, thus resembling the inferior sectorial of various existing *Carnivora.*

Char. specif.—Size about that of the tiger or jaguar, exceeding that of any other flesh-eater of the Wasatch epoch. The heel of the smaller tubercular-sectorial is not large, and has a plano-concave superior surface. The principal cusp is much elevated, while the internal cusp is small. The sectorial differs from that of a *Hyæna* in having the posterior cusp more, and the anterior cusp less elevated; the heel is only a strong posterior cingulum, which is continued as a narrow line along the inner base of the tooth. A rough cutting ridge forms the posterior inner angle of the principal cusp. There is a wide longitudinal groove of the inner face of the inferior canine, whose enamel surface is impressed-punctate. The shaft of the femur is nearly straight. Diameters of crown of sectorial, anteroposterior, .025; transverse, .014; vertical, .022; length of heel of tubercular-sectorial, .006; width of same, .006; vertical diameter of base of crown of canine, .022; depth of mandible at last molar, .044; length of femur (condyles inferential), .300; diameter of shaft at middle, .034.

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* See Proceed. Amer. Philos. Soc. 1880, July.

AMBLYPODA.

PANTODONTA.

31. **Coryphodon cuspidatus** Cope.

Part of the dentition of one individual.

32. **Coryphodon radians** Cope.

Apparently an abundant species.

DINOCERATA.

33. **Bathyopsis fissidens** gen. et sp. nov.

Char. gen.—These can only be given as seen in the mandible, the only part of the skeleton in my possession. Dentition: I. 3; C. 1; Pm. 4; M. 3. Incisors, canine, and first premolar forming an uninterrupted series, which is separated by a diastema from the molar series. The molar and premolar teeth are constructed on an identical pattern, presenting slight modifications from front to rear. This consists of an anterior elevated transverse crest, and a posterior heel with raised posterior border; between these is situated on the external side an elevated cusp, which sends a low ridge inwards and forwards. The inner extremity of the anterior crest is cusp-like, and is accompanied by a second internal anterior cusp immediately posterior to it. The mandibular ramus has great vertical depth, its inferior border being convex downwards throughout its entire length. Symphysis coössified.

The above characters indicate a new genus of considerable interest. Its form differs from that of the two genera where it is known, viz, *Uintatherium* and *Loxolophodon*, in the much greater development of the inferior expansion. In *Loxolophodon* it has been shown by Messrs. Speir and Osborne to be represented by a mere convexity. In *Uintatherium* Marsh has discovered it to be confined to the anterior part of the jaw, as in the sabre-tooth cats. In *Bathyopsis* it extends to the entire length of the ramus, giving an outline in profile much like that of *Megatherium*. The anterior extremity of the symphysis projects beyond the line of the anterior border of the inferior expansion.

The characters of the inferior molars in this and other genera of *Dinocerata* are very peculiar. In *Bathyopsis* they are constructed on the plan of those of insectivorous marsupial and placental mammals, so as to lead to the suspicion that its food consisted of crustacea, or insects of large size, or possibly of thin-shelled mollusca.

Char. specif.—This species was probably about the size of the Malayan tapir. The symphysis mandibuli is quite narrow, and its superior excavation is deep. It extends as far posteriorly as the middle of the diastema. It has considerable vertical thickness. The anterior edges of the lateral expansions are truncate, and present an obtuse angle outwards, which forms the anterior boundaries of the slight concavity of the lateral face. The middle of the expansion below the first premolar tooth is slightly convex. This wall encloses a large internal expansion of the dental canal, which issues in a large mental foramen. This foramen is situated near the middle of the vertical diameter of the expansion, and below the anterior part of the diastema. It looks downwards and forwards. The external face of the posterior part of the ramus is nearly plane. The inner face is vertical to a line which corresponds with the inferior border in *Coryphodon*, and then slopes obliquely outwards to the inferior margin. The base of the coronoid process rises vertically from the line of the alveolar border, and its external edge forms an anterior border for the masseteric fossa. The inferior border of the fossa is not defined. The inferior border of the ramus is decurved posteriorly, and projects inwards considerably beyond the plane of the jaw.

The premolars differ from the molars in having all their diameters excepting the vertical, reduced. The fourth premolar only differs from the first true molar in the less elevation of the posterior border of the heel, and in a little smaller transverse diameter. The external part of the heel of the last molar rises into an obtuse cusp; the remainder of the border is tubercular. The heels of the other true molars end in simple recurved transverse edges. On the premolars their posterior extremities are not recurved. The anterior face of the anterior cross-crest of all the molars is concave, and on the second premolar it looks obliquely inwards. The posterior or second anterior inner cusp is obsolete on the second premolar. The enamel on all of these teeth is, excepting where worn, rather finely wrinkled. The first premolar is not preserved, but its alveolus indicates that it is one-rooted and rather robust. The sizes of the alveoli of the other anterior teeth are arranged in the following order, commencing with the largest: C.; I.2; I.3. The alveolus of the canine is compressed, and has more than twice the anteroposterior diameter of the largest incisor. The alveoli of the first and third are subround; that of the second is somewhat compressed.

Measurements.

		M.
Length from the middle of the second incisive alveolus to the extremity of the last molar		.1950
Length of the series of consecutive molars		.1170
Length of diastema		.0240
Diameter of alveolus of Pm. I		.0090
Diameter of alveolus of canine		.0250
Length of premolars		.0460
Diameters of Pm. II.	vertical	.0130
	anteroposterior	.0130
	transverse	.0090
Diameters of Pm. IV	vertical	.0120
	anteroposterior	.0105
	transverse	.0120
Diameters of M. I	vertical	.0100
	anteroposterior	.0155
	transverse	.0110
Diameters of M. III	vertical	.0176
	anteroposterior	.0260
	transverse	.0180

The appearance of the ridges of the anterior part of the jaw of the *Bathyopsis fissidens*, together with the remarkably large dental canal and mental foramen, strongly suggest that the animal possessed a large and perhaps prehensile lower lip.

PERISSODACTYLA.

34. PALÆOSYOPS BOREALIS Cope.

American Naturalist, 1880, p. 746.

Founded on a portion of the right maxillary bone, which supports the three true molars and one premolar. Size of *Limnohyus fontinalis*, or much smaller than *P. lævidens*. Anterior median tubercle well developed; anterior and posterior cingula strong, not rising to inner cones. A low ridge extending outwards and forwards from posterior cone. Enamel smooth. Differs from *P. junior* Leidy in the presence of the intermediate tubercle and crest, and in the weak external cingulum. Length of true molar series, .063; diameters of first true molar, anteroposterior, .019; transverse, .020.

Portions of several individuals were obtained by Mr. Wortman.

35. LAMBDOTHERIUM POPOAGICUM Cope.

American Naturalist, 1880, p. 748.

Char. gen.—Dentition much as in *Limnohyus*, excepting that there is a diastema in front of the second inferior premolar. Presence of first inferior premolar not ascertained. Fourth inferior premolar without posterior cusps. Superior molars with an angular ridge extending inwards from each inner cusp. Last inferior molar with heel. This genus differs from *Oligotomus* in the simplicity of the fourth premolar, which has in the latter two posterior cusps. The V-shaped crests of the inferior molars separate it from *Hyracotherium*.

Char. specif.—The heels of the second and third premolars have a median keel; the third only has an anterior tubercle. The crest of the heel of the fourth forms an imperfect V. Heel of the last true molar small. No cingula; enamel smooth. Length of molar series, .080; of true molars, .044; of last molar, .019; depth of ramus at first premolar, .021; at last molar, .031. Second specimen: Diameters of crown of last superior molar, anteroposterior, .014; transverse, .016. About the size of the *Hyrachyus agrestis*.

This species was probably the most abundant perissodactyle of the epoch of deposit of the Wind River beds.

36. LAMBDOTHERIUM BROWNIANUM sp. nov.

Considerably larger than the *L. popoagicum*, and about equal to the *Tapirus terrestris*. The greater part of a lower jaw represents the species, and on this unfortunately only one of the premolar teeth remains. The three premolars are all two-rooted, and the posterior lobe of the last true molar is well developed. The inferior part of the external side of the ramus contracts or retreats rather abruptly posteriorly, below the last molar. It presents a slight external convexity below the second and third premolars. The alveolar line rises rapidly posteriorly, so that the last true molar is quite oblique. The second (first) premolar has a considerable heel, which is narrow and elevated on the middle line. The principal cusp is large and compressed, but obtuse, and has no anterior basal tubercle.

Measurements.

		M.
Length of six molars		.090
Length of true molars		.055
Diameters second (first) premolar	vertical	.009
	anteroposterior	.012
	transverse	.006
Length of base of first true molar		.015
Width of base of first true molar		.009
Length of base of third true molar		.023
Width of base of third true molar		.011
Depth of ramus at second premolar		.030
Depth of ramus at M. III	at front of tooth	.039
	at end of tooth	.047

Dedicated to my friend Arthur E. Brown, superintendent of the Philadelphia Zoölogical Garden.

37. Pachynolophus calciculus Cope.

Lophiodon calciculus Cope.

American Naturalist, 1880, p. 747.

Represented by lower jaws of two specimens. Transverse crests of inferior molars not connected by oblique ridges. Last true molar with a very small tubercle-like heel. A weak external basal cingulum; enamel smooth. Third and fourth premolars with wide heels, each with a single low ridge. Length of molar series, .053; of true molars, .033; of last true molar, .014; depth of ramus at penultimate molar, .025; diameters of penultimate superior molar at No. 2, antero-posterior, .012, transverse, .014.

This species is referred to *Pachynolophus* from its analogy to the *P. ventorum* in most respects.

38. Pachynolophus ventorum Cope.

Lophiodon ventorum Cope, American Naturalist, 1880, p. 747.

Larger than the last, and differing in having a large heel of the last true molar, and an elevated external tubercle on the heel of the fourth premolar. Enamel wrinkled; no external cingulum. Second premolar with a very short heel with an acute tubercle. Length of molar series, .064; of true molars, .040; of last true molar, .016; depth of ramus at second premolar, .020; at third true molar, .030. Seven individuals in the collection, one with complete series of maxillary teeth. These include four premolars (the first one-rooted), so that the formula M. $\frac{4}{3}$ $\frac{3}{3}$ is that of *Pachynolophus* Pom. rather than of *Lophiodon*. I refer another species to the same genus, by analogy, as it agrees in the dentition of the inferior jaw.

39. HYRACOTHERIUM ANGUSTIDENS Cope.

Apparently an abundant species. There are three sizes which I refer here, which may represent different species, but this cannot be determined without better material:

A. Depth of ramus at last premolar or first true molar, .0120; length of crown of first true molar, .0070; length of last true molar, .0100. Lower jaw of one specimen.

B. Depth of ramus, .0140; length of first true molar, .0065; of last molar, .0100. One lower jaw.

C. Depth of ramus, .0155; length of first true molar, .0075; of last true molar, .0100. Two individuals.

Portions of lower jaws of three other individuals in the collection are apparently referable to the *H. angustidens*.

40. HYRACOTHERIUM VENTICOLUM sp. nov.

Hyracotherium vasacciense Cope, American Naturalist, 1880, p. 747; not Report Expl. Surv. W. of 100th Mer. iv, p. 264.

Represented by an entire skull, with some bones of the skeleton, of one individual.

In general, this species is to be distinguished from its near ally, the *H. vasacciense*, by the slender mandibular ramus. The depth of this bone is about equal to that found in the larger varieties of the *H. angustidens*, but the teeth are much larger, having the proportions of those of the *H. vasacciense*. This remark applies especially to the last inferior molar.

The inferior canines form part of an uninterrupted series with the incisors. The superior canine is separated from the superior incisors by a diastema. The first premolar in both jaws is isolated. The second superior premolars have two cusps, and an internal ledge posteriorly. The third and fourth superior premolars are similar, the fourth displaying a little larger transverse diameter. The true molars are of subequal dimensions. Their external cusps are subconic. All the molars except the first and second premolars are entirely surrounded by a basal cingulum, which rises into a low cusp at the anterior external angle of the crown. The third inferior premolar has its two median cusps well separated and a wide posterior heel. The heel of the last premolar is wider, but carries no internal cusp. The external cusps on all the teeth wear into well-defined Vs. The posterior five molars have an external basal cingulum, but no other.

The mandibular ramus is compressed. The ascending ramus rises almost vertically a short distance posterior to the last molar. The symphysis is narrow, and extends to below the middle of the first premolar. The infraorbital foramen opens above.

Measurements.

		M.
Length of consecutive superior molars		.04500
Length of diastema between Pm. I and II		.00350
Length of second premolar		.00700
Width of second premolar posteriorly		.00500
Diameters fourth premolar	anteroposterior	.00700
	transverse	.00900
Diameters second true molar	anteroposterior	.00850
	transverse	.01120
Length of entire inferior premolar series		.05800
Length of entire inferior true molar		.00282
Diameters first true molar	anteroposterior	.00800
	transverse	.00600
Diameters last true molar	anteroposterior	.01200
	transverse	.00650
Depth of ramus at fourth premolar		.01650
Depth of ramus at third true molar in front		.01650

The lower jaw of a second individual agrees with the type in its proportions.

41. HYRACOTHERIUM CRASPEDOTUM Cope.

American Naturalist, 1880, p. 747.

Size of *H. tapirinum*, but the tubercles of the inferior molars are not connected by cross-crests, and they all possess a strong external basal cingulum, which also extends round on the posterior base of the I and II true molars. Heel of fourth premolar with a diagonal ridge; two anterior cusps well separated, and no tubercle in front of them. Second premolar with narrow heel; last true premolar with wide heel. Length of molar series, .056; of true molars, .033; of last molar, .014; depth of ramus at second premolar, .018; at last true molar, .023.

This is the largest species of the genus found in the Wind River beds. Parts of two individuals were obtained by Mr. Wortman.

42. OROTHERIUM VINTANUM ("Marsh") Cope.

Report Expl. Surv. W. of 100th Mer. iv, p. 255.

A portion of the mandible of a single specimen, containing the characteristic fourth premolar and other teeth.

ARTIODACTYLA.

A species of this order is represented by an astragalus. This is the first indubitable evidence of the existence of this order during the Wasatch epoch that I have seen. The following species are referred here provisionally only, as no part of their skeletons is known.

43. PHENACODUS VORTMANI Cope.

Hyracotherium vortmani, American Naturalist, 1880, p. 747.

This species is represented by portions of mandibles of four individuals. One of these supports the posterior four molars, another the posterior two, and another the last premolar and first true molar.

These indicate an animal of much smaller size than the *P. primævus*, but with a similar constitution of the molar teeth. The teeth support four conic cusps, which do not incline to fuse transversely, as is generally the case in *Hyracotherium*. Those of the posterior pair are separated by a tubercle, and a rudimental tubercle stands behind the notch between those of the anterior pair. The posterior median tubercle is developed into a heel on the last molar. On prolonged wear, the resulting pattern represents two Vs, the posterior limb of the posterior being regularly convex backwards. There are no cingula on any of the molars. The ramus is rather robust and is not deep.

Measurements.

No. 1.

	M.
Length of bases of posterior five molars	.0440
Length of bases of true molars	.0250
Depth of ramus at Pm. III	.0160
Depth of ramus at M. III in front	.0190

No. 2.

Diameters of M. II	anteroposterior	.0080
	transverse	.0070
Diameters of M. III	anteroposterior	.0080
	transverse	.0055

The characters of the typical specimen are as follows: The jaw fragment indicates an animal of about the size of the *Hyracotherium craspedotum*, but with the opposite cones of the inferior molars not united by cross-crests. There is a tubercle between the posterior pair of the first inferior true molar. The anterior tubercles of the fourth premolar are close together, and there is a strong cusp anterior to these. No basal cingulum on this tooth. Length of molars 3 + 4 + 5, .025; depth of ramus at Pm. IV, .018.

44. PHENACODUS PRIMÆVUS Cope.

A fragment of a lower jaw, with teeth.

45. PHENACODUS TRILOBATUS Cope sp. nov.

A lower-jaw fragment, supporting the three true molars, of one individual, represents this species. It is of the dimensions of the *P. primævus*, and displays the same general constitution of the teeth. The only difference noticeable is an important one. The anterior internal tubercle is accompanied by two others of less elevation—the one immediately anterior, the other immediately posterior to and not deeply separated from it. The internal face of these tubercles slopes obliquely outwards on the second and third true molars. The external tubercles have their external faces sloping inwards on all the true molars. There are no cingula.

Measurements.

		M.
Length of true molar series		.0390
Diameters of first true molar	anteroposterior	.0107
	transverse	.0097
Diameters of third true molar	anteroposterior	.0130
	transverse in front	.0100

GENERAL OBSERVATIONS.

Until the faunæ of the Wasatch and Bridger epochs are better known it will not be possible to fix the relation which that of the Wind River beds holds to them. It is, however, quite evident that in some respects it differs from both, both by what it possesses and what it lacks. In the following lists these differences are displayed so far as they relate to genera. The left-hand column represents the Wasatch, the middle the Wind River, and the right hand the Bridger.

Wasatch.	Wind River.	Bridger.
Clastes	*Clastes.*	*Clastes.*
	Pappichthys.	*Pappichthys.*
Crocodilus.	*Crocodilus.*	*Crocodilus.*
Plesiarctomys.	*Plesiarctomys.*	*Plesiarctomys.*
		Myops.
	Vesperugo.	?*Vesperugo.*
Calamodon.	*Calamodon.*	
Esthonyx.	*Esthonyx.*	
Ectoganus.		
		Anchippodus.
	Ictops.	?*Ictops.*
		Mesonyx.
	Miacis.	*Miacis.*
Didymictis.	*Didymictis.*	?
Oxyæna.		?
Pachyæna.		?
	Protopsalis.	?
Stypolophus.	*Stypolophus.*	*Stypolophus.*
	Microsyops.	*Microsyops.*
Pantolestes.	*Pantolestes.*	*Pantolestes.*
Pelycodus.	*Pelycodus.*	?
		Tomitherium.
		Anaptomorphus.
Coryphodon.	*Coryphodon.*	
	Bathyopsis.	
		Uintatherium.
	Palæosyops.	*Palæosyops.*
	Lambdotherium.	?
?*Pachynolophus.*	*Pachynolophus.*	
Hyracotherium.	*Hyracotherium.*	?
Orotherium.	*Orotherium.*	?
		Hyrachyus.
Phenacodus.	*Phenacodus.*	

From the above it is evident that the Wind River fauna includes genera which have been hitherto restricted to either the Wasatch or Bridger lists. Of these, especially Bridger genera, there are six; that is, six genera which have not yet been detected in beds of the Wasatch epoch. On the other hand, there are nine genera which have been found in Wasatch beds and not in those of the Bridger. Three important Wasatch genera have not been found in the Wind River formation, while seven of the characteristic genera of the Bridger are not included in the list of those of the Wind River. The result, imperfect as it is, indicates a considerably greater conformity to the Wasatch epoch than to the Bridger in the faunal characters of the Wind River beds, and points to the confirmation of Dr. Hayden's views as to the identity of the two epochs.

The new species above described will be fully illustrated in the fourth volume of the Report of the United States Geological Survey of the Territories, F. V. Hayden in charge, now passing through the press.

BULLETIN

OF THE

UNITED STATES GEOLOGICAL AND GEOGRAPHICAL SURVEY OF THE TERRITORIES.

VOLUME VI. 1881. NUMBER 2.

Art. IX.—Annotated List of the Birds of Nevada.

By W. J. Hoffman, M. D.

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PREFATORY NOTE.

The present paper is based partly upon notes and observations made in Nevada during the field season of 1871, The northernmost point visited was Bull Run Mountain, from which locality the several field parties spread toward the west and east in their southward journey, the former crossing the State line and entering California near the 118th meridian, while the latter continued nearly southward along the 115th meridian to Gold Mountain, thence westward to Owen's Valley, California, from which point one party travelled irregularly toward the southeast, crossing Death Valley, Armagosa and part of the Mojave Deserts to Fort Mojave, continuing the journey up the Colorado River, by boat, to a point beyond the State boundary. The other party, upon leaving Owen's Valley, continued nearly eastward along the "Old Spanish Trail" as far as Saint George, Utah. The greater portion of the southern interior of the State consists of arid deserts, which, together with our unavoidably forced marches, permitted but little work to be accomplished in ornithology.

To complete the list as far as possible I have quoted from the reports of several prominent authorities who visited the localities beyond the one just described. They consist of—I, that furnished by Mr. Ridgway, whose observations extended over an area about 70 miles in width, beginning at parallel 39° at the southeastern limit to that of 42° at the northeastern, including most of the northern portion of Nevada; II, Mr. Henshaw's observations in the vicinity of Carson City; III, the notes furnished by Mr. Henshaw and Dr. Yarrow regarding the fauna of Southeastern Nevada in connection with a list of the birds of Utah; and IV, the observations of Dr. Cooper, at Fort Mojave, Arizona. This military post is situated upon the elevated eastern bank of the Colorado River, while about the immediate vicinity of the post the groves of timber o cupy the low bank on the opposite side. The country receding from either shore is covered to some extent by generally worthless shrubbery, though northward the valley widens in several places and presents a pleasing landscape.

Further information regarding the reports of the authorities cited, in addition to others relating to the birds of the region under consideration, will be found by reference to the Appendix.

W. J. HOFFMAN, M. D.

WASHINGTON, D. C., *February*, 1881.

REMARKS ON THE DISTRIBUTION OF VEGETATION IN NEVADA AS AFFECTING THAT OF THE AVI-FAUNA.

There is probably no other area of like extent within the confines of the United States that presents a greater variety of physical features than Nevada; and as the distribution of birds is closely correlated with that of the vegetation, it becomes a matter of propriety as well as of interest to refer to the subject more fully than would under ordinary circumstances be necessary. Extending from latitude 35° to 42° north, and from longitude 114° to 120° west, this region embraces about 112,000 square miles of surface, presenting nearly every variety of geologic configuration and condition of soil, from the fertile and cultivated valley to the parched and arid desert, exhibiting also extreme forms of vegetation, from the lichens of the zone of perpetual snow to the sub-tropic varieties of *Cactaceæ*, &c.

The average altitude of Nevada is about 5,600 feet. The greatest depression—which receives all the drainage of the northern half of the State—is located in the western portion, while toward the east there is a gentle rise in elevation, as well as southward, until at a point between Mount Nagle and Mount Magruder, when the descent toward the Colorado River and the Mojave Desert becomes more rapid. Throughout the northern portion the water-courses are more numerous, furnishing an abundant flora, while in the southern half of the State there exist immense areas which are nearly, if not totally, destitute of vegetation, with scarcely any indications of moisture save an occasional spring of brackish or saline water; here also we find the ridges and mountain peaks with scarcely any arboreal growth, unless their summits penetrate the zone of *Coniferæ*.

In a previous paper* on the distribution of vegetation in portions of Nevada, &c., the flora was divided into four distinct classes, viz: I, the flora of the mountains; II, the flora of the foot-hills; III, the flora of the plains; and IV, the flora of the salt marshes. To these may be added the aquatic, as well as other subdivisions of which further notice will be of no special interest in this connection. In addition to the fact that the timber-line increases in elevation as the latitude decreases, every other succeeding zone of vegetation follows in regular sequence.

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*Am. Nat. x, 1877, pp. 336-343.

The following table, representing a series of prominent localities arranged according to latitude from the extreme northern portion of Nevada southward and slightly eastward to a point in Arizona, will serve to illustrate this fact more distinctly:

Locality.	Latitude.	Altitude above sea-level.	Elevation of timber-line.	Elevation of surrounding plain.
	° ′	*Feet.*	*Feet.*	*Feet.*
Camp McDermitt	42 58	4,700		[‡]
Bull Run Mountain	41 40	8,450	8,300	5,800
Prospect Hill	39 30	9,650	9,400	6,000
Belmont Peak	38 40	12,000	9,700	7,000
Mount Nagle	37 46	11,000	[*] 11,000	7,200
Mount Magruder	37 40	11,500	11,150	7,200
San Francisco Mountain (Arizona)	35 13	13,500	[†] 12,500 13,000	6,500 6,800

[*] The summit of Mount Nagle does not reach the altitude of the timber-line.

[†] San Francisco Mountain is referred to as illustrating the elevation of the timber-line in its southward course, there being no peak in Nevada, south of Mount Magruder, of sufficient height to do so.

[‡] Camp McDermitt is located near the mouth of a cañon formed by a break in the Santa Rosa Mountains, through which runs a very clear and pure stream, known as the East Branch of Quinn's River. (Report of the Hygiene of the United States Army, &c., Circular No. 8, War Department, Surgeon-General's Office, Washington, 1875, p. 514.)

If we take, for example, the zone of *Coniferæ* at any given point in the northern portion of the State, as at Bull Run, we find the timber-line at an elevation of about 5,800 feet, while the lower range of the trees composing this belt terminates irregularly where the mountain mahogany—*Cercocarpus ledifolius*—begins, presenting a thickness in altitude of perhaps 2,000 feet. When this zone is again examined at one of the southernmost peaks, we find the timber-line to have risen to more that 11,000 feet above sea-level, or more than 5,200 feet above the altitude of the same line at Bull Run. In the mean time, the mountain mahogany—which had existed at Bull Run as but a narrow zone and rested upon one composed chiefly of *Salicaciæ*—has been replaced by the coniferous trees above and the salicaceous below, but the latter has also risen with the preceding, as do the zones succeeding the latter, *e. g.*, *Compositæ*, *Artemisiæ*, &c. The *Artemisia* at Mount Magruder, instead of occupying the plains as at Bull Run, covers the foot-hills, while the lower slopes show numerous examples of *Yucca brevifolia*, *Cactaceæ*, &c., these zones having risen in elevation with their predecessors, so that the plains present species not found north of this latitude, while southward this new zone again rises in elevation, again presenting a still newer form beneath it, and so on.

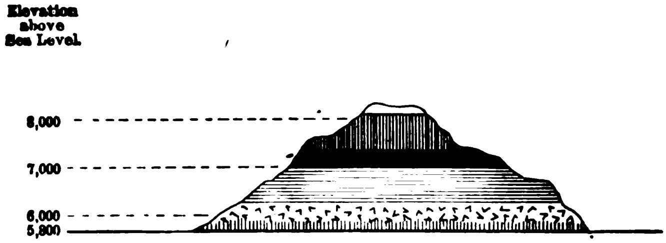
The regular and successive elevation of vegetation is more fully represented in the accompanying illustrations, sections I to V.

The lines of demarcation, indicating the termination of one zone and the beginning of another, are often abrupt and so remarkably distinct as to be visible from any elevated point of observation, this being due to the characteristic coloration of the foliage of plants composing the zones. Frequently, however, the limit of growth of plants or trees upon a mountain slope can only be approximately ascertained by observing the altitude where the representatives of two zones appear to be about equal, and either way from which point the species of one or the other will begin to predominate in greater number to the exclusion of the other. This is the case upon the mountains in the southern portion of the State; the lower line of the zone of *Coniferæ* is represented chiefly by the nut-pine (*Pinus monophyllus*) and the western cedar (*Juniperus occidentalis*) which, resting upon the upper edge of the zone of *Salicaciæ*, marks the line below which the Piñon Jay (*Gymnokitta cyanocephala*) is seldom found, while in the lower zone we find the Robin (*Merula migratoria propinqua*), Hammond's Flycatcher (*Empidonax hammondi*), and Gairdner's Woodpecker (*Picus pubescens gairdneri*), which may be considered peculiar to that zone and seldom ascending into the one above it. In addition to the species just named as characteristic of, or generally resorting to, the *Coniferæ*, are *Sialia arctica*, *Lanivireo solitarius plumbeus*, and *Lanius ludovicianus excubitorides*.

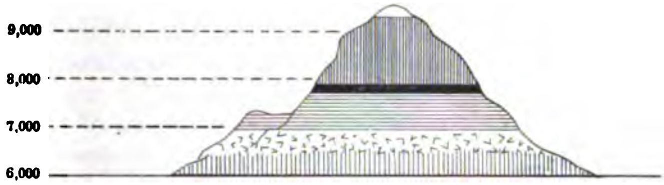
Although the zone of *Salicaciæ* is readily determined, representatives of it diverge to either side along the the mountain cañons where there is moisture, and sometimes away out into the adjacent plain. The more common species of trees composing the zone proper, as well as the branches which follow the water-courses, are the willows, cottonwood, and aspen; and some of the more prominent species of birds frequenting them in greater or less number are *Dendrœca æstiva*, *Geothlypis trichas*, *Tachycineta bicolor*, *Passerina amœna*, *Icterus bullocki*, *Asio americanus*, *Tinnunculus sparverius*, &c. These represent only a few of the constant summer visitors to this wide-reaching zone, but they are confined to certain elevations and genera of trees composing the zone with more characteristic persistency than most any other species which I had the opportunity to note.

Upon the plains in Northern Nevada, where the sage-brush (*Artemisia tridentata*) predominates, the characteristic species are *Oreoscoptes montanus*, *Spizella breweri*, *Phalænoptilus nuttali*, *Centrocercus urophasianus*, and most prominently so *Amphispiza nevadensis*. In the southern interior of the State *O. montanus*, *P. nuttali*, and *C. urophasianus* were found in the same belt of vegetation, which had risen to an elevation of over 8,000 feet, while in the former region the same vegetation occurs mainly below 6,000 feet.

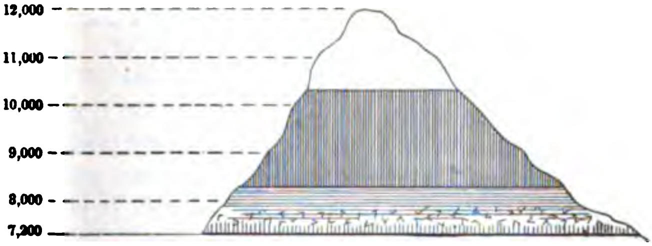
In the zone of vegetation below the *Artemisiæ*, which appears in consequence of the elevation of the latter in the southern part of the State, we detect in regular order *Yucca baccata*, *Y. angustifolia*, *Cacti* of various sub-genera, and toward the deserts *Eriodiction*, *Algarobia*, and *Prosopis*. Amongst the latter, especially in the regions east, northeast, and north of Fort Mojave, the avi-fauna is that of the Colorado Valley



SECTION I. BULL RUN MT.



SECTION II. PROSPECT HILL



SECTION III. BELMONT PEAK

proper, the species thus far found being mentioned in the list under their respective names.

There are a number of species, resident during the winter in the greatest depression of the northwestern portion of the State, which assume a vertical migration during the summer, crossing the different zones until they reach the cooler wooded summits of the mountains. The most prominent examples are *Regulus callendula* and *Certhia familiaris americana*. Species whose vertical range is very great, though not resident, are *Merula migratoria propinqua*, *Pyranga ludoviciania*, *Picus villosus harrisi*, *Selasphorus platycercus*, and *Colaptes auratus mexicanus*.

Over the arid deserts of the northern half of Nevada, three species appeared common, viz, *Eremophila alpestris chrysolæma*, *Zenidura carolinensis*, and *Corvus corax carnivorus*. The occurrence of *Trochilus colubris* at an elevation of 9,700 feet (near the timber-line) is only consistent with what has been stated before regarding the elevation and distribution of the several zones of vegetation as marking the limit beyond which certain species of birds do not usually pass. In the tropics this species has been detected at an altitude of 14,600 feet, the altitude of the same zone, while its northern and southern migrations extend respectively to latitude 61° and Tierra del Fuego. That certain species of birds extend over a great vertical range in the tropics is well known, and this can readily be attributed to the great altitudes at which the several zones of vegetation are found in that region, which ascend from both the northern and southern parallels of latitude, to which von Humboldt refers in the following passage: "The great elevation attained in several tropical countries, not only by single mountains but even extensive districts, enables the inhabitants of the torrid zone to behold also those vegetable forms which, demanding a cooler temperature, would seem to belong to other zones. Elevation above the level of the sea gives this cooler temperature even in the hottest parts of the earth, and cypresses, pines, oaks, berberries, and alders nearly allied to our own cover the mountainous districts and elevated plains of Southern Mexico and the chain of the Andes at the equator."*

The zones of vegetation characteristic of the upper portion of Mexico occur in the tropics at altitudes corresponding to the mean temperature of the former localities, which would place the outside limit of elevation at about 10,000 feet. M. Becquerel says: "In the equatorial zone no change is observed in the vegetation from the level of the sea to the height of 600 metres (1,969 feet), and beyond this even to an altitude of 1,200 metres (3,937 feet) we still recognize the flora of the tropical zone."†

From the preceding remarks it will be observed that the absence of birds in large areas of Nevada, and their abundance in certain localities, can mainly be attributed to the peculiar distribution of the vegetation. With the birds as with insects, particularly the Coleoptera,

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*Aspects of Nature, &c. Tr. by Mrs. Sabine. Philada., 1849, pp. 245, 246.
†Smithsonian Report, 1869, p. 401.

if an area of vegetation, composed of a certain class, be found, we generally know what may be expected as typical of that area. The greater altitudes attained in the Rocky Mountains have furnished additional facts regarding the breeding of certain species which may truly be considered sub-alpine when compared with their northward range. Future investigations will throw much light upon this subject, especially so in connection with the region under consideration.

LIST OF BIRDS.

TURDIDÆ.

Hylocichla ustulata (Nutt.) Baird.—Russet-backed Thrush.

Appears to be a rare visitor in Nevada, Mr. Ridgway having obtained but a single specimen not far from the eastern base of the Sierras, in the Truckee Valley. It occurs more frequently, according to this observer, in the pine-clad regions of the mountains.

Hylocichla ustulata swainsoni (Caban.) Ridgw.—Olive-backed Thrush.

Was found by Mr. Ridgway in the eastern portion of the State at the East Humboldt Mountains. No specimens were noted in the interior of Nevada.

Hylocichla unalascæ (Gmel.) Ridgw.—Dwarf Thrush.

Of rare occurrence. Mr. Ridgway secured but one specimen at Trout Creek, Upper Humboldt Valley, and Dr. Cooper saw but a few in the Colorado Valley, where they seem to remain only for the winter, and none after April 1.

Merula migratoria propinqua Ridgw.—Western Robin.

Usually found in abundance along the timbered bottom lands of the upper portion of the State. During breeding season occur in the timbered mountains, as at Bull Run, where these birds were building during the latter part of May, although the snow had not all disappeared in the ravines about the foot-hills. Mr. Ridgway found this species extremely abundant in the vicinity of Carson City from the middle of March until the middle of April, and again in the valley of the Truckee, below the "Big Bend," in August, being attracted thither by the fruit of the buffalo-berry (*Shepherdia argentea*). According to Dr. Cooper but few came about Fort Mojave during the winter, though flocks are said to wander as far south as Fort Yuma.

The Robin is said to be a winter resident, selecting the underbrush, willows, and cottonwoods fringing the streams. The only difference between this and the eastern species is the general pallor of the plumage, for which it has been distinguished as a geographical race, and for which Mr. Ridgway at first proposed the name *Turdus migratorius propinquus*, Ridg.*

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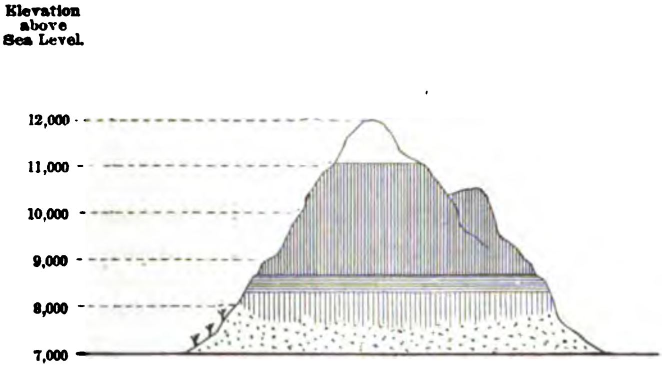
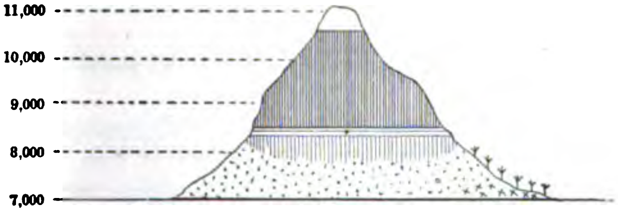
* Bull. Nuttall Ornith. Club, v. ii, 1877, p. 9.



SECTION IV. MT. NAGLE



SECTION V. MT. MAGRUDER

PROFILES

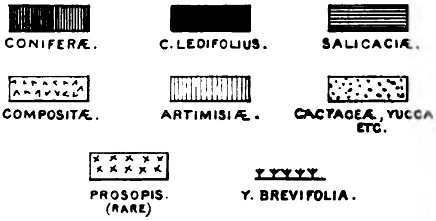
Illustrating the Distribution

OF THE

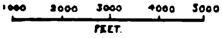
PREDOMINATING VEGETATION

ON SOME OF THE

MOUNTAINS OF NEVADA.



VERTICAL SCALE.



Hesperocichla nævia (Gmel.) Baird.—Varied Robin.

This species is distributed more particularly over the northwestern coast region of the United States, thence northward to Alaska. Lieutenant Ives' party procured one specimen in the Colorado Valley in 1858, which thus far seems to limit its southern range. Dr. Cooper found it in the lower portion of California in winter, and states that it is very probable that some breed in the evergreen forests of the north, as they do near the mouth of the Columbia, and that in October they come down to the valleys, and are quite common in winter near San Francisco. Mr. Henshaw[*] says: "A male of this species which I saw confined in a cage in a store in Carson City was said by the owner to have been captured during the previous spring (1876) in the adjoining mountains. For this statement I cannot vouch, but give it for what it is worth." This thrush had not been recorded from any locality east of the Sierras, excepting four instances of its occurrence on the Atlantic coast, all within a limited area, though, as Mr. Henshaw says, there seems to be no reason why during the migrations, as in the case of other birds possessing a similar summer habitat, the species may not occur along the eastern slope. Since the above notes were published by Mr. Henshaw the following has been received from him regarding this species:[†] "In winter occurs along the eastern slope [of the Sierras] and is found in Nevada at the base of the mountains at least as far south as Carson; leaves for the north about the first of April."

Oreoscoptes montanus (Towns.) Baird.—Mountain Mockingbird; Sage Thrasher.

Of frequent occurrence throughout the northern and middle sections of the State; found in the valleys amongst the sage-brush, though usually in greater numbers in the vicinity of streams, as in Independence Valley, Humboldt Valley, near Mineral Hill, and Deep Spring Valley. Mr. Ridgway records Carson City, Austin, and the Humboldt Valley, at Oreana, as localities. None were again seen south of Belmont, though favorable localities were found.

Mimus polyglottus (Linn.) Boie.—Mockingbird.

The Mockingbird found on the Pacific coast appears, according to Dr. Cooper, "to form a peculiar variety, differing from the eastern in being larger and having the tail more graduated, besides some minor differences of color." At Fort Mojave this species was rare in March, and so shy that no shot could be had at them. The same observer further states that they were common in May along the Mojave River, and westward to San Diego.

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[*] Ann. Rep. Geog. Sur. west of the 100th meridian. Being Appendix N N of Ann. Rep. Chief of Eng'rs, 1877, p. 1315.

[†] Letter dated December 5, 1878.

Harporhynchus redivivus lecontei (Lawr.) Coues.—Leconte's Thrasher.

Dr. Cooper states that he secured two near Fort Mojave, along the route in the Colorado Valley to the San Bernardino Mountains. Dr. Coues secured a specimen in 1865, about 15 miles east of the Colorado River, at a point a little above Fort Mojave. It is very probable that the species will yet be recorded from within the limits of Nevada, as the valley in the vicinity of, and northward from Fort Mojave contains considerable shrubbery and groves of cottonwoods; as well as the more elevated portions of the valley and the sandy foot-hills contain an abundance of *Cacti*, *Algarobia*, *Yucca brevifolia*, &c., certainly not presenting the most pleasing aspect, but affording sufficient retirement to birds during the breeding season.

Harporhynchus crissalis Henry.—Rufous-vented Thrasher.

Dr. Cooper found this species rather common at Fort Mojave, but very shy. At Cottonwood Island, and again near the mouth of the Black Cañon, several specimens were seen, which, from our position in the boat, appeared to resemble this species. They had been flying from bush to bush at some distance ahead of us, when at the first break in the undergrowth they disappeared.

CINCLIDÆ.

Cinclus mexicanus Swains.—American Water Ouzel.

Mr. Ridgway reports this species as occurring in the West Humboldt Mountains and the Truckee River, east of the Sierras. I have met with it only on the western slope of the Sierra Nevada, in a cañon leading down toward King's River. The large stream rushing down this rocky channel was fed by the lakes of snow water near the summit, and seemed a favorite resort, especially about the deeper pools immediately below the successive falls. The cañons leading down the eastern slope of the mountains toward Independence were also well watered, but no specimens were noted, although they may occur.

SAXICOLIDÆ.

Sialia mexicana Swains.—Californian Bluebird.

This bird was obtained by Mr. Ridgway at Carson City, west of which locality, according to Mr. Henshaw, it was also observed to be numerous among the pines at an elevation of about 7,000 feet, during September and October. Dr. Cooper states it as a probable summer resident of the Colorado Valley.

Sialia arctica Swains.—Rocky Mountain Bluebird.

This species was found distributed over the middle and northern portions of Nevada. During the last week in May it was abundant throughout the timbered hills, especially at Antelope Creek and the mountains around Bull Run, where it appeared to be confined more particularly to the areas covered with mountain mahogany. None were observed south of Hot Spring Cañon, 60 miles northeast of Belmont. Mr. Henshaw says "they winter among the pines and in the brushy ravines," probably referring to the eastern slope of the Sierras west of Carson City, where most of his observations were made. Mr. Ridgway found this bird on the Ruby Mountains in July and August, "only in the upper portion of the timber belt at an elevation of from 9,000 to 11,000 feet, where it nested both among the rocks and in the deserted holes of woodpeckers among the stunted pine, cedar, or mahogany trees. The same observer also found this species at the East and West Humboldt Mountains, in the Toyabe Mountains, and Washoe and Truckee Valleys. Dr. Cooper says it has been found at Fort Yuma in winter. It is very probable that the species winters in the wooded portions of the Colorado Valley, north of Fort Mojave, but as the warm weather approaches it no doubt follows the timbered ranges west of that region, as the country immediately west and north of the river is a desert region with but few examples of arboreal vegetation, though instead, furnishing an abundance of *Cactaceæ*, *Yucca*, &c.

SYLVIIDÆ.

Myiadestes townsendi (Aud.) Caban.—Townsend's Solitaire.

This species seems to prefer the higher coniferous regions, and is more frequently found on the Sierras, northward to the Cascade Mountains and westward, than on the eastern slopes. Mr. Ridgway reports it as occurring on the timbered interior ranges, especially among the cedar groves.

Phainopepla nitens (Sw.) Scl.—Black-crested Flycatcher.

Mr. Ridgway found this bird in the western portion of Nevada, where it is supposed to be a rare summer visitor. It was observed, however, in the valley at the northern slope of Mount Magruder, on the eastern timbered foot-hills of the Inyo Range, west of Columbus, and again at Spring Mountain, near the "Old Spanish Trail," though only at rare intervals. Dr. Cooper found this species numerous on the Colorado in the winter, and states that they "do not migrate much south of latitude 35°," leaving again in April for the north. When once seen, this bird is not easily mistaken for any other species on account of its brilliant black plumage and the white spot on the spread wings, which become very prominent and conspicuous in flight.

Polioptila cærulea (Linn.) Sct.—Blue-gray Gnatcatcher.

This species is reported from the Colorado Valley, where it was noted on March 20. Mr. Ridgway remarks: "In the chaparral of the western foot-hills of the Sierra Nevada we observed in July a species of this genus, in considerable plenty. To all appearance it was the same species as that found in the East, but as no specimens were obtained we cannot be positive that the individuals in question were not *P. plumbea.* They were certainly not *P. melaneura* [*californica*], which would have been recognized by its black crown." The most northern range on the Pacific coast is fixed at 42° by Dr. Coues, while on the Atlantic seaboard the Connecticut Valley seems to be the terminus of their eastern migration. Although not actually reported from Nevada, excepting the instance of the Colorado Valley—which is not positively definite as to exact location—the species is undoubtedly to be found there, as future investigations may show.

Polioptila plumbea Baird.—Plumbeous Gnatcatcher.

Dr. Cooper gives this as a winter resident about Fort Mojave, in small numbers, where he procured one in February.

Polioptila californica Lawr.—Black-tailed Gnatcatcher.

This species is only recorded from Fort Mojave, by Dr. Cooper, where he found it rather common during the whole winter. Mr. Gruber found it as far north as 39°, on the Sierra Nevada, and it is probable that its easternmost range in that latitude may bring it down to the foot-hills into Nevada.

Regulus calendula (Linn.) Licht.—Ruby-crowned Kinglet.

Abundant during the fall months among the pines on the eastern slope of the Sierras, near Carson City.—(*Henshaw.*) At this place it was found most numerous in April.—(*Ridgway.*) The species was also observed at West Humboldt Mountains and in the Truckee Bottom, near Pyramid Lake, by the latter authority.

Regulus satrapa Licht.—Golden-crowned Kinglet.

One of the most diminutive of the birds of Nevada, excepting the Humming Birds, and appears to be rare. Mr. Ridgway observed "a few individuals in the cañons of the West Humboldt Mountains, among the thick bushes along the streams."

PARIDÆ.

Lophophanes inornatus (Gamb.) Cass.—Plain Titmouse.

This species has thus far been reported only from the eastern foot-hills of the Sierras, where Mr. Henshaw found it "a resident, but not numerous." Mr. Ridgway also notes its occurrence near the same locality as frequenting the cedar and piñon forests.

Parus montanus Gamb.—Mountain Chickadee.

Mr. Ridgway states that "the distribution of this species seems to be governed entirely by that of the coniferous woods; consequently, we find it in all pine forests, as well as the more extensive of the piñon and cedar woods on the interior ranges." Two specimens were collected by him at Carson City.

Psaltriparus plumbeus Baird.—Lead-colored Tit.

This bird has been noted by Mr. Ridgway as occurring at Carson City, West Humboldt Mountains, where it was common in September, and among the cedars on the Virginia Mountains in November, where it was in company with Gray Titmice (*Lophophanes inornatus*). In the southern portion of the State it has not yet been found, although Dr. Cooper thinks it probable that some come down to the Colorado Valley along the eastern branches, where Dr. Kennerly found it; still it is doubtful whether this would bring it within the limits of the State.

Psaltriparus melanotis (Hartl.) Bp.—Black-eared Tit.

On the 4th of August, 1868, we saw near our camp on the eastern slope of the Ruby Mountains what was unquestionably a bird of this species, since the black patch on the ear-coverts was distinctly visible. Its restless movements made ineffectual our attempt to shoot it, and before we were prepared for another shot it disappeared among the cedar trees and could not be found again. This we believe is the first known instance of its occurrence within the limits of the United States, though it has been obtained near our borders, and is a common bird of the high mountain portions of Northern Mexico; but it probably occurs in greater or less numbers in suitable places throughout our southern Rocky Mountains.—(*Ridgway.*)

Auriparus flaviceps (Sundev.) Baird.—Yellow-headed Tit.

This bird is mentioned as occurring at Fort Mojave, where Dr. Cooper found it in the thickets of *Algarobia.*

SITTIDÆ.

Sitta carolinensis aculeata (Cass.) Allen.—Slender-billed Nuthatch.

This bird was not observed in any locality within the interior of the State, and, as Mr. Ridgway states, is strictly confined to the elevated coniferous regions, procuring several specimens near Carson City.

Sitta canadensis Linn.—Red-bellied Nuthatch.

Like the preceding this species is confined to the dense pine regions. Mr. Ridgway noticed it in the aspen groves along the streams in the Upper Humboldt Valley in September, and late in the same month in the Clover Mountains, at an altitude of nearly 11,000 feet. Lieutenant Ives' party found it as far south as Fort Yuma, though this may have been an exceptional find.

Sitta pygmæa Vig.—Pigmy Nuthatch.

Also occurs in the elevated pine regions, and appears more abundant than either *S. carolinesis aculeata* or *S. canadensis*. Dr. Cooper notes one from Lake Tahoe, in the Sierras, as larger than the specimen from Monterey, Cal., the original locality of the species, though this difference may have been owing to age. Mr. Ridgway secured specimens at Carson City from February to April.

CERTHIIDÆ.

Certhia familiaris rufa (Bartr.) Ridgw.—Brown Creeper.

Is found in the pine regions during summer, and retires, according to Mr. Ridgway, to the timbered valleys during the winter. Specimens of what appeared to be this species were observed at Bull Run Mountain about May 25. Mr. Ridgway found it more or less common in the valleys of the Truckee and Carson Rivers during winter, the date of capture of his specimen being marked December 7.

TROGLODYTIDÆ.

Campylorhynchus brunneicapillus (Lafr.) Gray.—Cactus Wren.

This species was met with only in the sandy deserts, about 30 miles northwest of Fort Mojave, among the cactus and yucca. Its northern limit on the Californian side is fixed at about 36°, though on the eastern side of the Sierras it is noted by Mr. Henshaw as occurring at Saint George, Utah. In the interior basin it is probably confined more particularly to the deserts of Southern Nevada, west of the Colorado River, which abound in cactus in considerable variety and profusion.

Salpinctes obsoletus (Say) Caban.—Rock Wren.

Dr. Cooper notes of this species, "Their song begins to be heard at Fort Mojave in February, and continues through the spring." They probably leave the valley upon the approach of warm weather, following the mountains in their northern migration, which extends as far as the upper boundary of Nevada. Mr. Henshaw states it to be very common throughout the eastern portions of the State, while Mr. Ridgway procured specimens in March and April at Carson City, and during September and October in the West Humboldt Mountains.

Catherpes mexicanus conspersus Ridgw.—White-throated Wren.

Probably a winter resident of the State, Dr. Cooper finding it in April at Fort Mojave. Mr. Ridgway states that its distribution and habits are somewhat similar to the Rock Wren (*S. obsoletus*), although no specimens are actually mentioned as secured either at the eastern slope of the Sierras nor at any other locality favorable to its occurrence.

Thryomanes bewicki spilurus (Vig.) Baird.—Californian Bewick's Wren.

During the winter was observed at Fort Mojave by Dr. Cooper, where it left, probably for the mountains, in April. Mr. Ridgway noticed what seemed to be this species at Glendale, Nev., in November. "The specimen in question was seen among the willows bordering the river, and disappeared before we could decide whether it was this species or the Wood Wren (*Troglodytes parkmani*)."

Troglodytes aëdon parkmanni (Aud.) Coues.—Western House Wren.

This bird is widely distributed in Nevada, being found with considerable frequency along the interior valleys near the settled districts, and where shrubbery abounds; was found breeding at Morey in June, the nest being built in a hollow log projecting from the corner of a deserted hut. This species is abundantly noted from the upper portions of the State, specimens being procured at the West and East Humboldt Mountains, Truckee Bottom, and Secret Valley. None were found south of Belmont after July 1, though the barrenness of the country may have caused this to some extent.

Anorthura troglodytes pacificus (Baird.) Ridgw.—Western Winter Wren.

As far as known, this species appears to be rare in Nevada. One individual only was observed by Mr. Ridgway, which he also secured, in the Truckee Bottom, near Pyramid Lake.

Telmatodytes palustris paludicola Baird.—Tule Wren.

Occurs generally in marshy localities, especially where there is a growth of tule (*Scirpus validus*). The southernmost locality where this species was found was in the valley immediately north of Mount Magruder, the whole valley being extremely favorable for birds, though few species were found. It was also found along the head-waters of the several tributaries of the Humboldt, especially so in Independence Valley, Maggie Creek, &c. Mr. Ridgway procured specimens in the Truckee Bottom, and the Meadows.

MOTACILLIDÆ.

Anthus ludovicianus (Gm.) Licht.—American Titlark.

Quite common in the latter part of summer and in the fall in Eastern Nevada. (*Henshaw.*) Mr. Ridgway found this species abundant in winter, in localities of a nature calculated to attract them. "At the Truckee Meadows they came in immense flocks in November, and spread over the soggy meadows, where they remained during the moderately cold weather, during the greater portion of the winter, occasionally congregating by thousands about the haystacks and corrals." They were also found in moderate numbers at Rose's Ranch, north of Battle Mountain, and in the vicinity of Tuscarora during the latter part of May.

SYLVICOLIDÆ.

Helminthophaga luciæ Cooper.—Lucy's Warbler.

Although not reported from Nevada, Dr. Cooper, the discoverer of this species, found it upon the eastern bank of the Colorado River, at Fort Mojave. It is probable that the bird will yet be found upon the western shore, the country presenting similar physical characteristics, with a general distribution of mesquite and other comparatively worthless vegetation common to the deserts.

Helminthophaga virginiæ Baird.—Virginia's Warbler.

This species was not found west of the Ruby Mountains by Mr. Ridgway where it was rather common in July and August, but eastward, on all the ranges having equally extensive growths of timber. It is not noticed by Dr. Cooper as occurring in the vicinity of Fort Mojave, but was found to be a summer resident at Fort Whipple, Arizona, where Dr. Coues secured a young bird in August.

Helminthophaga ruficapilla (Wils.) Baird.—Nashville Warbler.

Although widely distributed over temperate North America, this bird seems to be an occasional visitor, if we can judge from the records so far published regarding it. It was found in Secret Valley, East Humboldt Mountains, in September, "where it was more or less common at that season of the year in the thickets along the streams in the lower portion of the cañons." (*Ridgway.*) The specimen procured by the gentleman just quoted, furnished the type of *H. ruficapilla* var. *gutturalis* (Baird, Brewer, and Ridgway, Hist. N. A. Birds, i, 1874, 191, pl. xi, fig. 8), characterized "by the yellow of the throat confined strictly within the maxillæ, and not, as in true *ruficapilla*, covering the cheeks. Should this peculiarity prove constant, the western birds may be distinguished by that name."

Helminthophaga celata (Say) Baird.—Orange-crowned Warbler.

Mr. Ridgway reports this "as most frequently met with during its autumnal migration, at which time it was the most abundant of all the species of the family." In the fall they are found in the shrubbery of the lower cañons. It is supposed that this species has its western range at the localities given—Upper Humboldt Valley, at Deering's Creek—their greater abundance occurring in the Wasatch Mountains, Utah, and the Rocky Mountains, still further east.

Helminthophaga celata lutescens Ridgw.—Lutescent Warbler.

The brightly-colored specimens representing this variety were found by the discoverer to prevail in the western depression of the Great Basin, but not east of the upper portion of the Valley of the Humboldt.

Dendrœca æstiva (Gmel.) Baird.—Summer Yellow Bird.

A summer resident in most favorable localities. Dr. Cooper notes its arrival at Fort Mojave about the middle of April. I found this species quite abundant throughout the areas covered by willows and the mountain mahogany, south of the Pacific Railroad, as at Eureka, and the hills south, east, and west, where streams were found. None were observed south of Belmont after July 5.

Dendrœca auduboni (Towns.) Baird.—Audubon's Warbler.

As is the case with other species the migrations of this one seem to be mainly if not entirely vertical, its summer home being, according to Mr. Ridgway, among the pine forests of the mountains, while during the winter it retires to the thickets of the lower valleys. In habits it resembles the eastern species, *D. coronata*, to which it also bears some resemblance. In May, June, and July numbers of these birds were noticed in the more fertile and timbered tributaries of the Humboldt River, though none were found south of Mount Nagle.

Geothlypis macgillivrayi (Aud.) Baird.—McGillivray's Warbler.

This bird arrives at Fort Mojave during the latter part of April, where Dr. Cooper noticed it. Its distribution is general throughout the northern half of the State where the country is favorable, its haunts being in the fertile valleys and cañons amongst the shrubbery.

Geothlypis trichas (Linn.) Caban.—Maryland Yellow-throat.

Not observed in the lower portions of the State, though it occurs in the upper part quite frequently. Found in the vicinity of water-courses in shrubbery; wherever found they were associated with individuals of the preceding form, which is the only one found breeding in the mountains.

Icteria virens longicauda (Lawr.) Coues.—Long-tailed Chat.

Dr. Cooper notes the arrival of this species from the south about the 20th of April. At the same locality a nest was found on May 19 containing three eggs, besides a parasitic one—*Molothrus ater*. It breeds in the upper portions of the State about twenty days later than the time noted for the last-named locality. Mr. Ridgway also found this species scattered across the State, along the line of his journey of observation.

Myiodioctes pusilla (Wils.) Bp.—Black-capped Yellow Warbler.

I have not found any direct reference to the occurrence of this species in Nevada, except that of Mr. Ridgway's, who found it a rare summer resident, though becoming exceedingly numerous in autumn. Its haunts are nearly the same as those of *Dendrœca æstiva*.

Myiodioctes pusilla pileolatus (Pall.) Ridgw.—Pileolated Warbler.

This variety differs from the true *pusilla* in the brighter yellow on the fore parts and the head. Habitat similar to the preceding.

Setophaga ruticilla (Linn.) Swains.—American Redstart.

Although not mentioned by any of the authorities who have more particularly had occasion and opportunity to investigate the distribution of the avi-fauna of the Great Basin, or more especially that area under consideration, it is very probable that this species will yet be reported from the eastern part of Nevada, where the country is more favorable on account of the well watered and timbered valleys, found near the head-waters of the various tributaries of the Humboldt River. The bird has been noticed as occurring in Utah, where Mr. Ridgway found it common throughout the summer in the Wasatch district, remarking its abundance also in the valleys and lower portions of the cañons, but not in the mountains. Its western limit extends to the arid, treeless areas, indicating the eastern borders of the Great Basin proper; still its occurrence in isolated, though favorable localities, may very possibly bring it within the limits of Nevada.

VIREONIDÆ.

Vireosylva gilva swainsoni Baird.—Western Warbling Vireo.

This species occurs from the willows of the bottom-lands up to within a short distance of the timber-line. It is also noticed as being widely distributed, by Mr. Ridgway, who obtained specimens from various localities between the Truckee Valley and Great Salt Lake. Dr. Cooper says they occupy the country west of the Sierras from San Diego to Puget's Sound during the summer, but probably leave the State (California) in October.

Lanivireo solitarius (Vieill.) Baird.—Blue-headed Vireo.

One specimen was obtained by Mr. Ridgway in September among the cañon thickets of the western slope of the Clover Mountains. Dr. Cooper found a "few at Fort Mojave, Colorado Valley, after May 14, when they began to make themselves conspicuous by singing, but in a few days seemed to have passed away towards the north."

Lanivireo solitarius cassini (Xantus), Ridgw.—Cassin's Vireo.

This rare and little known species was noticed only in the cañons of the West Humboldt Mountains, where it was not uncommon in September. Those found had probably migrated from the region to the northwestward, or from the Cascade Mountains or the country adjacent.—(*Ridgway.*) The points regarding this supposed species as differing from *solitarius* are summed up as follows:* "Its much duller and more brownish olivaceous, with little contrast between the head and back, impurity of the white loral line and orbital ring, together with a general buffy or ochraceous tinge of the under parts, where *solitarius* is pure white." Mr. Henshaw says of this variety: "They were, however, here [Mount Graham, Ariz.] quite rare as compared with *solitarius;* but, near Camp Crittenden, the last few days of August, quite a number were seen among the deciduous trees. Their seeming preference for the deciduous trees over the coniferous timber is the only point wherein their habits seem to differ from those of the Solitary Vireo."

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* Birds of the Colorado Valley, p. 514.

Lanivireo solitarius plumbeus (Coues) All.—Plumbeous Vireo.

This species, belonging more particularly to the Rocky Mountain region, was found by Mr. Ridgway on the eastern slope of the Ruby Mountains. According to Mr. Henshaw, it is common during summer among the pines of the mountains.

Vireo belli Aud.—Bell's Vireo.

But a few years since Mr. Henshaw secured a single individual on the Gila River, Arizona, showing its occurrence in the Southwest. If Dr. Cooper's notice at Fort Mojave is correct, the species is no doubt to be looked upon in Nevada as an extremely rare visitor, although Dr. Cooper's *belli* has long been supposed to be *V. pusillus.*

LANIIDÆ.

Lanius borealis Vieill.—Great Northern Shrike; Butcher Bird.

Noted by Mr. Ridgway at Carson City during February and March, where it occurred in the sheltered ravines along the foot-hills of the mountains. This species appeared at all times less common than *excubitorides.*

Lanius ludovicianus excubitorides (Sw.) Coues.—White-rumped Shrike.

Dr. Cooper found this bird common at Fort Mojave during the winter, leaving for the timbered cañons and hills in spring. Over nearly the whole of the area from Bull Run Mountain southward as far as Belmont and westward toward the Inyo Range, California, we found this species in the higher belts of timber. At Eureka, especially along the western slope of Prospect Hill among the groves of *Cercocarpus*, thence southward toward Hot Spring Cañon, along the densely-covered hills, this bird was conspicuous, being frequently observed in its search for food by suddenly darting from a dry projecting branch upon which it had been patiently and silently watching. In the Valley of the Humboldt, and as far north as Independence Creek, the cottonwood groves seemed the favorite resort of this bird, a fact due, perhaps, more to the general abundance of cottonwood trees to the exclusion of pines.

AMPELIDÆ.

Ampelis garrulus Linn.—Northern Wax-wing.

The only report regarding this species is that by Dr. Cooper, who saw it at Fort Mojave in January, 1861, which is the first instance of its occurrence in the United States.

Ampelis cedrorum (Vieill.) Baird.—Cedar Wax-wing.

Found in the Upper Humboldt Valley in September along the streams flowing from the Clover Mountains.—(*Ridgway.*)

HIRUNDINIDÆ.

Progne subis (Linn.) Baird.—Purple Martin.

Apparently not as common as other species of this family. Mr. Ridgway found them at Carson City, and at Virginia City only one individual was seen on the 18th of June. Dr. Cooper has not seen them in the Colorado Valley, although they are common on the Pacific coast at a much higher latitude, from which they leave for the south in August.

Petrochelidon lunifrons (Say) Lawr.—Cliff Swallow.

This species is usually abundant in the vicinity of rivers, streams, and even large springs in fertile valleys, as at one locality near the divide between Deep Spring and Smoky Valleys. In many places against the face of the limestone cliffs the nests of these birds were built and apparently heaped upon one another in the greatest profusion. Immediately beneath the ledges, which were vertically about 80 feet high and extended horizontally for about 100 yards, there was continuation of the piñon woods visible in every direction, except about an eighth of a mile below, where the timber ended and the grassy valley stretched away toward the east. The springs and a small rivulet rising in the hills on the south were fringed with an abundance of willows and small cottonwoods, where we first noticed these birds during the afternoon of our going into camp. The next day, however, we found their habitations, and even saw the birds flying in all directions over the hills above the cliff in pursuit of insects, as various localities, though presenting an absence of timber, were amply covered with various flowering plants upon and about which there appeared sufficient numbers of lepidoptera and orthoptera, furnishing perhaps the principal food of these birds in this portion of the State.

Hirundo erythrogastra Bodd.—Barn Swallow.

Although a species of general distribution, its occurrence in many portions of Nevada has yet to be recorded. Mr. Ridgway found it most abundant around Pyramid Lake, while Dr. Cooper reports its passing Fort Mojave for the north during the last week in May. In the timbered hills south of Eureka, along a short range of cliffs, were found great numbers of Cliff Swallow (*Petrochelidon lunifrons*) who had constructed their nests in nearly every available spot. Specimens were noticed amongst the latter, supposed to be *erythrogastra*, but none were secured so as to definitely settle the question.

Tachycineta bicolor (Vieill.) Caban.—White-bellied Swallow.

Mr. Ridgway found this species on the Wasatch Mountains, at an altitude of 8,000 or 9,000 feet. Its occurrence in Nevada is also noted, more especially throughout the western portion of the State, near Pyramid Lake, Carson City, &c. They are not very gregarious during the breeding season, and but few are found together at any particular locality at that time, though later in the season they have been found in large flocks, probably preparatory to migration. Dr. Cooper thinks this species is to some extent a constant resident in California, a few wintering in the extreme southern portion.

Tachycineta thalassina (Swains.) Caban.—Violet-green Swallow.

This species is reported from Pyramid Lake and the East Humboldt Mountains, where Mr. Ridgway found it abundant, and frequented the cliffs of calcareous tufa, where they were observed to enter the fissures of the rock to their nests within.

Cotile riparia (Linn.) Boie.—Bank Swallow.

Noted by Mr. Ridgway as rather abundant at Truckee Reservation in May. Found at Provo, Utah, by Mr. Henshaw. This species appears to associate with the Rough-winged Swallow (*Stelgidopteryx serripennis*), its habits being similar, though it is found less abundant.

Stelgidopteryx serripennis (Aud.) Baird.—Rough-winged Swallow.

Dr. Cooper found this species as early as February 27, and Mr. Ridgway observed it in April at Carson City, where it was the most abundant species of the family. I noticed these birds also along the banks of the Humboldt River, north of Battle Mountain, during the last days of May, where they are probably summer residents. They build in burrows in the sandy banks, the openings leading to the nests being from one to two feet below the upper edge of the bank, similar in this respect to those of the preceding species.

TANAGRIDÆ.

Pyranga ludoviciana (Wils.) Bp.—Western Tanager.

Found rather common in the timbered areas along the water-courses during the month of June, though later was found in the wooded regions of the interior. Mr. Ridgway states that the note of the young is like the complaining call of the Eastern Blue-bird (*Sialia sialis*), but louder; on the contrary, the song of the adult is scarcely distinguishable from that of our *P. rubra.*

Pyranga æstiva cooperi Ridg.—Cooper's Tanager.

This beautiful bird is reported as quite common in the Colorado Valley, at Fort Mojave. Although resembling to some extent our Eastern *P. æstiva*, in which the head above is more dusky like the back, the same region in *cooperi* is similar to the red of the throat, readily furnishing the means of identification.

Singular as it may seem, the call-note of this bird, according to Dr

Cooper, is "Ke-dik," which, in the Mojave language, means "Come here." "They also sing in a loud, clear tone, and a style much like that of the robin, but with the faculty of making the sound appear very far distant, which is a protection to birds of such bright plumage."

FRINGILLIDÆ.

Carpodacus cassini Baird.—Cassin's Purple Finch.

Found in the vicinity of Carson City, and on the East Humboldt Mountains, by Mr. Ridgway.

Carpodacus frontalis (Say) Gray.—House Finch.

Found rather common, and generally distributed over the northern half of the region under consideration. Frequents the settlements, where it is reported as rather injurious to some forms of vegetation. The species was observed on the southern slope of Spring Mountain, near the "Old Spanish Trail," and has also been noted on the Colorado, by Dr. Cooper.

Loxia curvirostra americana (Wils.) Coues.—American Crossbill.

Found on the East Humboldt Mountains by Mr. Ridgway, who states that the species may breed on the higher portions of the loftier ranges in the interior. Their chief food is obtained from the seed-cones of the pines, although they are reported as destroying the buds of trees, and even tearing open apples merely to get at the seed. I have noticed these birds in confinement and watched their manner of picking up seeds (rape, hemp, and canary), which could only be successfully done when several layers deep, on account of the apparently deformed bill. Although not strictly a songster when in a wild state, the males learn to sing very readily, sometimes closely imitating Canaries and other birds of a similar class, though the voice still retains some of its harshness, which can be easily noticed. The practice of snaring and trapping these birds for the market has been rather successfully carried on by a German bird-catcher in Reading, Pa., for the past six or eight years, where the observations on the captive specimens were made.

Loxia leucoptera Gm.—White-winged Crossbill.

A male of what was probably this species was noticed by Mr. Ridgway on the eastern slope of the Ruby Mountains. He thinks it probable that the species breeds sparingly on the loftier ranges. Mr. Ridgway further states that "when first seen, this individual called instantly to mind the adult male of *Pyranga erythromelæna*, of Mexico and Central America, so rich and uniform was the bright carmine-red of the plumage, while the pure white wing-bands contrasted conspicuously with the deep black of the wings and tail. It is scarcely possible, however, that it could have been this southern Tanager, which has not yet been taken near our southern border. It should be considered, however, that a specimen of *Psaltriparus melanotis*, also a Mexican bird, not before detected in the United States, was observed in the same locality at nearly the same time."

Considering the abundance of this species in the regions directly north of Nevada, it is not improbable that its occurrence within the State limits, upon the elevated ranges, may be rather frequent.

During the present winter (1880–'81) I had occasion to visit Pennsylvania, and while in Reading learned that a flock of about twenty individuals were frequently noticed in the cedar groves on Mount Penn, in company with the common *L. curvirostra americana.* One year ago a small flock was observed in the same locality, several specimens of which were secured. The extremely cold weather during the present season no doubt caused this extreme southern range, as within the past twenty years, during which time I have been always on the lookout for northern species, I have neither seen this species, nor heard of its occurrence so far south in that portion of the State.

Leucosticte tephrocotis Swain.—Gray-crowned Rosy Finch.

This species has been taken at Lake Tahoe, in the Sierra Nevada Mountains, and were said to be plentiful there during extremely cold weather. Captain Stansbury found them common at Salt Lake City in March, 1850, and it is more than probable that during extremely cold winter weather they may be found along both sides of the Sierras, from the Oregon line southward.

Leucosticte tephrocotis littoralis (Baird) Coues.—Hepburn's Rosy Finch.

This is the largest of the *Leucosticte*, and the only note of observation of either of the species occurring in the United States, relating specifically to Nevada, is that given by Mr. Ridgway. He states that "a single flock of this species was seen on the 5th of January in the outskirts of Virginia City, Nev. The flock comprised perhaps fifty individuals, all busily engaged in gleaning from the surface of the snow, flitting restlessly over one another in the manner of Lapland Longspurs, at the same time uttering a twittering note."

Astragalinus tristis (Linn.) Cab.—American Goldfinch.

Although found to be common in various localities west of the Sierras, in California, this species does not appear, excepting at rare intervals, east of that range. The plants furnishing the seeds preferred by this bird, such as thistles, &c., are of rare occurrence in the dry regions of Nevada, but where these are found, as on the foot-hills in the southern extremity of Smoky Valley, the species was also observed, though there were less than half a dozen individuals, who may at that time have been mere migrants.

Astragalinus lawrencei (Cass.) Bp.—Lawrence's Goldfinch.

Although found in California the occurrence of this species is rare in the Interior Basin, the only observation being that of Dr. Cooper, who saw a few at Fort Mojave, and says it seems more of a sylvan species than *tristis*, sometimes feeding on the ground on grass-seeds as well as on the buds of various plants and trees, but prefer the willows and cottonwoods growing in wet places. In the Colorado Valley they fed upon the seeds of *Artemisia*, sp. (?)

Chrysomitris pinus (Wils.) Bp.—Pine Goldfinch.

Occur during the summer in all the pine forests. They have the same gregarious habits as *C. tristis*, though they rarely descend to the surface vegetation, preferring the pines, feeding upon the seeds of various coniferous trees, willows, &c.

Centrophanes lapponicus (Linn.) Caban.—Lapland Longspur.

Mr. Ridgway recognized this species during the severe winter weather among the large flocks of Horned Larks (*Eremophila alpestris*) around Carson City. It is probable that during the cold weather they visit the northern portions of Nevada, as their southern limit east of the Rocky Mountains extends farther south during similar seasons.

Passerculus sandwichensis alaudinus (Bp.) Ridgw.—Western Savannah Sparrow.

This variety has been found by nearly all observers throughout the marshy districts of the northern and middle regions of the State, and is one of the most abundant of the genus.

This species is chiefly represented on the California coast by *anthinus*,[*] and from the Columbia River northward to Alaska by *P. sandwichensis savanna*.[†]

Poœcetes gramineus confinis Baird.—Western Grass Finch.

Abundantly distributed over the plains in the upper portions of the State, arriving at Carson City, according to Mr. Ridgway, in April. They migrate southward during the autumn, and have been found a winter resident in the Colorado Valley.

Coturniculus passerinus perpallidus Ridgw.—Western Yellow-winged Sparrow.

Generally distributed over the valley portions, as Mr. Ridgway found it, though not near the marshes, like the Savanna Sparrow, but upon the drier grassy plains. Was found to breed near Eureka.

Chondestes grammica strigata (Sw.) Ridgw.—Western Lark Finch.

Common in favorable localities over nearly the whole of Nevada. Dr. Cooper did not find it in the Colorado Valley in the vicinity of Fort Mojave, though it has been obtained at Fort Yuma.

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[*] *Passerculus anthinus*, Bonap.—As above stated is found throughout the marshy areas of the Pacific coast, has a slender bill, and is much more heavily marked below with small dark and distinct spots.

[†] *P. sandwichensis savanna* (Wils.), Ridgw.—This species was found on the Columbia River in spring and fall only, during their migrations from the north and south. Dr. Cooper thinks, therefore, that as they were absent from that locality from April to October, they probably spent the winter in Southern Oregon and California.

Zonotrichia leucophrys **(Forst.)—White-crowned Sparrow.**

What Mr. Ridgway now considers to be this species was found by him breeding very abundantly at Summit Meadows, the highest point of Donner Lake Pass, in the Sierra Nevada, in July, 1867.

Zonotrichia gambeli intermedi **Ridgw.—Intermediate White-crowned Sparrow.**

What Mr. Ridgway thought to be this species was found by him breeding very abundantly at the Summit Meadows; but Mr. Ridgway now considers it more probable that the bird observed there was *Z. leucophrys*. Numerous specimens were also obtained by him in the West Humboldt Mountains. This species was met with several times in the more southern portions of the State, particularly in the elevated and fertile valleys just north of Mount Magruder; again, sparingly, east of Spring Mountain, in September.

Zonotrichia coronata **(Pall.) Baird.—Golden-crowned Sparrow.**

The only specimen seen of this species was captured by Mr. Ridgway, who states that it was shot from a flock of *Z. intermedia.* "Its occurrence on the West Humboldt Mountains may be accounted for by the fact that many of the Pacific coast species have a tendency to straggle eastward during their migrations, among those which reach this range, besides the bird under consideration, being *Melospiza guttata*, *Pipilo oregonus*, *Lanivireo cassini*, *Helminthophaga lutescens*, &c."

Spizella montana **(Forst.) Ridgw.—Tree Sparrow.**

A common species throughout the northern regions, though farther south was found more sparingly and only in the more elevated and fertile areas. This species is very widely distributed, specimens having been procured on the Yukon River, where it also breeds. Captain Bendire mentions it as occurring about Tucson during winter; have found it in Dakota during the winter months, also in Pennsylvania during February and March.

Spizella domestica arizonæ **(Coues) Ridgw.—Western Chipping Sparrow.**

Found generally distributed throughout the wooded districts of the upper half of the State. Was rarely seen in the Colorado Valley during September, although Dr. Cooper found it wintering there in large numbers.

Spizella breweri **Cass.—Brewer's Sparrow.**

Quite common in the northern and middle areas, where it was noticed more particularly in the vicinity of settlements. In its predilection for fields or any bushy localities, Mr. Ridgway also found this species a counterpart of the eastern *S. pusilla*, which it resembles only in this respect, as its nest and eggs are widely different, being more like those of *S. socialis*. Dr. Cooper found small flocks of this species, after th

20th of March, frequenting the grassy spots among low bushes, and thinks they remain in the Colorado Valley during the summer. Dr. Coues also found it in small numbers at Fort Whipple, where they are said to breed.

Junco oregonus (Towns.) Scl.—Oregon Snowbird.

Winters in the western portions of Nevada, and has also been noted in the Colorado Valley during the same season. According to Dr. Coues, is an abundant winter resident in Arizona, arriving at Fort Whipple early in October, where they remain until the middle of April. Those remaining in Nevada during the mild winters retire to the Sierra Nevada Mountains upon the first approach of moderating weather in spring.

Amphispiza bilineata (Cass.) Coues.—Black-throated Sparrow.

Like *A. nevadensis* this species also occurs throughout the sage-brush regions in the northern and middle portions of the State, but in the southern regions was found in the elevated deserts, between Spring Mountain and the Colorado, containing an abundant growth of *Algarobia* and *Yucca baccata.* According to Dr. Cooper they descend to the hills near the Colorado during the winter.

Amphispiza belli nevadensis Ridgw.—Sagebrush Sparrow.

According to Mr. Ridgway, the distribution of this species seems to be strictly governed by that of the sage-brush (*Artemisia*), since it is present in nearly all the districts abounding in this class of vegetation, while it is apparently wanting in localities of any other character. This species probably occurs in the Colorado Valley as far north as Fort Mojave, it having been observed farther south, and on the Gila in Arizona.

Melospiza fasciata fallax Baird.—Mountain Song Sparrow.

Rather common, though more particularly so in the eastern and southeastern portions of the State. Mr. Ridgway's collection seems to have been obtained chiefly in Utah, though the Humboldt Valley furnished some specimens.

Melospiza fasciata heermanni Baird.—Heermann's Song Sparrow.

Appears to be more particularly distributed along the extreme border near the Sierras, while in the eastern portions of the State it appears to be less common; here *fallax* occurs and seems to replace it to some extent. Occurs also in the southern part of Nevada, opposite Fort Mojave, and westward toward the Pacific coast, where Dr. Cooper found it.

Melospiza fasciata guttata (Nutt.) Baird.—Rusty Song Sparrow.

Individuals of this variety were met with in the West Humboldt Mountains by Mr. Ridgway.

The remaining varieties of the ordinary type have been arranged by

Mr. Ridgway and Dr. Coues into *gouldii* (from the California coast, San Francisco, and southward), *rufina* (from the Pacific coast north of British Columba), *insignis* (from Kodiak and Oonalashka), and *mexicana* (from Pueblo, Mexico).

Melospiza lincolni (Aud.) Baird.—Lincoln's Finch.

Was found during the summer only in the elevated parks of the higher mountain ranges by Mr. Ridgway, though during its migrations was abundant in the lower valleys.

Passerella iliaca megarhyncha (Baird.) Ridgw.—Thick-billed Sparrow.

This interesting bird was met with by Mr. Ridgway only in the ravines of the Sierra Nevada, near Carson City and Washoe. It was found mostly in damp or swampy places in the lower portion of the mountains. It is considered as strictly a migrant at the above localities, arriving from the south about the 20th of April.

Passerella iliaca schistacea (Baird.) Allen.—Slate-colored Sparrow.

This occurs at the same locality as *P. megarhyncha*, though earlier, from which Mr. Ridgway supposes that a few remain over winter, finding shelter in the dense willow thickets along the river. The same authority observed it again in September in similar localities in the Upper Humboldt Valley.

Pipilo maculatus oregonus (Bell) Coues.—Oregon Towhee.

A straggler of this species was secured in October, 1867, on the West Humboldt Mountains by Mr. Ridgway.

Pipilo chlorurus (Towns.) Baird.—Green-tailed Towhee.

This species was first observed in the upper portion of the State during the middle of May, frequenting the shrubbery and trees along the ravines. This may have been rather an unusual resort, as, according to Mr. Ridgway, it ordinarily frequents the brushwood and rank herbage of the flowery slopes, characteristic of the higher mountain regions. In numerous localities the snow was still upon the ground, especially upon the northern slopes, the ravines being well timbered with mountain mahogany and pines, thus appearing to furnish the best retreat during the unexpected recurrence of colder weather. In crossing the divide between Hot Spring Cañon and Belmont this species was again seen. According to Dr. Cooper it winters in the Colorado Valley, though rather sparingly.

Pipilo aberti Baird.—Abert's Towhee.

This bird is reported from the Colorado Valley by Dr. Cooper, but as the latitude is not specified we can only suggest that the observation refers to the vicinity of Fort Mojave, as the gentleman named was stationed at that post, where most of his investigations were carried on.

Zamelodia melanocephala (Swains) Coues.—Black-headed Grosbeak.

Found in the cañons along the northern border of Independence Valley, and at Bull Run Mountain, from the upper limit of the growth of mountain mahogany down to the termination of ravines; was again noticed two miles south of Mineral Hill, but nowhere south of that locality. Mr. Ridgway also secured specimens of the species in the West Humboldt Mountains. Dr. Cooper reports it as a summer visitor at San Diego and Santa Cruz, while Dr. Coues states it to be abundant at Fort Whipple during the summer, remaining as late as the end of September. Has not been reported from the southern portion of Nevada, although presume it to occur in the elevated regions at Mount Nagle and Mount Magruder.

Guiraca cœrulea (Linn.) Swains.—Blue Grosbeak.

This species was met with in the valley north of Mount Magruder, and on the western border of Deep Spring Valley, along the base of the Inyo Range, California. Dr. Cooper saw this bird first at Fort Mojave, on the 6th of May, although becoming rather more common later, frequenting the trees and bushes along the river.

Passerina amœna (Say) Gray.—Lazuli Bunting.

Is found in nearly all fertile regions along the mountain slopes and valleys. Several specimens secured were found associating with *Sialia arctica* at Bull Run Mountain, though they had probably just arrived there, May 25. Found later in the season throughout the lower interior portion of the State in the elevated valleys near Mount Nagle, Mount Magruder, and Spring Mountain.

Calamospiza bicolor (Towns.) Bp.—Lark Bunting.

The discovery of this species in Snake Valley, by Dr. Yarrow, is the first notice of its occurrence within the borders of the State. Mr. Ridgway found one specimen near Parley's Peak, Utah, and Mr. Henshaw noted its residence near Zuñi, (?) N. Mex., and in the Valley of the Gila, in Arizona. Colorado is also given as a locality, especially about Fort Garland, thus presenting a wide geographical range beyond the area of its original discovery. I found no traces of the species in Northern Nevada, although the most favorable localities were searched for birds generally; still it is probable that the species is more generally distributed over that portion of the State than we have at present any knowledge. My opportunities for observing the habits of this interesting bird during the breeding season occurred later in the upper portion of Dakota, especially along Knife River, which appeared to be the only locality in that portion of the Territory where the species was common, or rather occurred at all as far as could be ascertained. The birds were not so shy as generally reported, and in several instances the men attached to the command actually trod upon the very borders of the nests before the parent birds would leave them. The nests were generally built upon the ground near the tufts of grass, though sometimes within the tufts where not too compact, and constructed rather loosely of grass, fine rootlets, &c. The eggs number from four to five, and in a number of instances were found parasitic eggs of *Molothrus ater*.

The plumage of the males changes nearly to that of the females later in the season, though I found in several instances, upon male birds secured in June, quite a sprinkling of white feathers about the neck and breast, as though there might be a tendency toward partial albinism. The males have a habit of rising a short distance above the nest, over which they hover while singing, thus acting as a guide, without which many hours might have been spent in searching for the desired localities. In the region just referred to the Skylark (*Neocorys spraguei*) was found a common associate of this species.

ICTERIDÆ.

Dolichonyx oryzivorus (Linn.) Swains.—Bobolink; Reed-bird; Rice-bird.

The discovery of this bird in Nevada was made by Mr. Ridgway at the Overland Ranch, in Ruby Valley, where it was common in August, in the wheat fields. It was not met with in summer, and it is considered doubtful by the above author whether it breeds anywhere in the interior south of the 40th parallel. Mr. Henshaw says it is "rather common in the fields in the vicinity of Provo, Utah. The parent birds were noticed feeding their young, scarcely fledged, July 25."

Molothrus ater (Bodd.) Gray.—Cow-bird; Cow Blackbird.

This species is rare according to the observations of Mr. Ridgway, but three specimens being noted and obtained by him. Mr. Henshaw reports it from Utah, where he secured several specimens in Provo Cañon. Dr. Cooper thinks that a few pass the winter in the Colorado Valley, and, perhaps, also in the San Joaquin Valley, but he saw none at any time nearer the coast. Several specimens were seen at Camp Independence, Cal., in August, but nowhere else during the expedition. This genus is represented farther south by *M. obscurus*, but has not been reported from any locality north of the southern portion of Arizona, belonging more properly to the Northwestern Mexican fauna.

Xanthocephalus icterocephalus (Bonap.) Bd.—Yellow-headed Blackbird.

This large and handsome bird was found common in all the marshy regions and grassy meadows from Independence Valley southward to Fort Mojave, excepting in the southern interior valleys, which appear too much isolated and constricted. They seem to prefer the cultivated areas in the vicinity of settlements, and were frequently found in great numbers in and about the corrals and gardens of the frontier ranches. The Red-winged Blackbird was usually found in the same region with this species, though they appeared to breed in settlements by themselves, mingling more freely while searching for food during the morning and late afternoon. They are known to winter in the Colorado Valley, though only in moderate numbers. Mr. Ridgway observed a few individuals at Carson City during the winter, showing that the species is only partially migratory. The habit of frequenting the vicinity of settlements was observed, also, on the Upper Missouri, where these birds were very destructive to the early vegetables in the post garden.

Agelæus phœniceus (Linn.) Vieill.—Red-and-buff-shouldered Blackbird.

This bird is common in nearly all the marshy districts of the whole State, in the northern and middle regions being found in company with *Xanthocephalus icterocephalus.* At Grapevine Springs, at the head of Armagosa River (?), a single male was seen and secured. The most interesting feature of the locality is, that the spring and its outlet covers less than a mile in length, and is isolated from all other oases by many miles of desert country. This specimen and one of *Tringoides macularius* were, with the exception of several Green-winged Teals, the only birds seen at this isolated spot.

Agelæus phœniceus gubernator (Wagl.) Coues.—Red-and-black-shouldered Blackbird.

The occurrence of this species is doubtful in the Colorado Valley, though in the upper portion of the State it was noted by Mr. Ridgway at Carson City and the Truckee Reservation.

Agelæus tricolor (Nutt.) Bp.—Red-and-white-shouldered Blackbird.

A rare species in the Colorado Valley, though apparently very common nearer the Pacific coast, in California, as far as Santa Barbara, from which point, according to Dr. Cooper, they seem to pass north toward Klamath Lake and Southern Oregon by a more interior route.

Sturnella neglecta Aud.—Western Meadow Lark.

This bird is reported by nearly all observers as generally abundant in suitable localities. The first specimen was secured on the Humboldt River, near Carlin, on the 20th of May, although the snow was still lying on the shady slopes of the foot-hills. The grassy valleys are the usual resort of this variety, although the adjacent prairies are also visited, especially in the northern portion of the State, where the undulating country is more abundantly covered with *Compositæ*, the southern regions being either bare of vegetation or presenting *Artemisia*, &c., in excess. The song of the Western Lark has been so often referred to by various authors that it is scarcely necessary even to mention the fact. When I heard the bird for the first time, not knowing the author, it appeared a strange medley of musical notes, no particular bar of which could be attributed to any known species. Whenever I have observed this bird singing it was perched upon the top branch of a bush or low tree, with the head partly elevated as in our *S. magna*, but often there appeared a studied care in the delivery of the musical changes, as if the song had been but recently acquired or was not thoroughly familiar to the singer. Then again there would flow forth a run of melodious notes that strongly suggested a more proficient songster than one would suppose to find in this bird. The nesting habits observed later in the season correspond with observations made subsequently in Dakota Territory, where they appeared to select the tufts of tall grass in the more fertile regions, between or near which they constructed their nests, consisting of grass, &c.

As regards the coloration of the western variety nothing need be said, but I have observed quite a number of specimens secured in the Schuylkill Valley, Pennsylvania, especially from Reading, as far southeast as Philadelphia, some of which resemble *neglecta* so closely that, were the locality of capture unknown, identification would be almost impossible. As a rule, however, that persistency of coloration characteristic of *neglecta* does not prevail in the eastern variety, in which it is found rather variable, and rarely the deviation consists only of a slight pallor of the breast and neck, the yellow patch becoming more ashy and not so intense as in *magna* proper. The song of the eastern form is also like that of *magna*, and this variation of plumage appears about as frequently as instances of total or partial albinism in *Passer domesticus.*

Icterus parisorum Bonap.—Scott's Oriole.

The only probable instance of the occurrence of this bird within the latitude of the lower extremity of the State is that given by Dr. Cooper, who says: "This species is abundant at Cape St. Lucas, and has been found at rare intervals all along the southern border of the United States as far east as Texas. I saw a bird at Fort Mojave, in April, which I supposed to be this, but could not obtain it." Mr. Henshaw, in his Annotated List of the Birds of Arizona, says it is not uncommon in the extreme southeastern part in summer, and Captain Bendire adds that he found it breeding at Tucson. Considering the general uniformity of the physical characters between the two regions (Fort Mojave and Tucson), it is more than probable that individuals may wander as far up the Colorado River as Mojave, as future observations will no doubt prove.

Icterus bullocki (Swains.) Bp.—Bullock's Oriole.

This beautiful bird is common throughout the timbered bottom lands, and holds the same place in the Interior Basin that the Baltimore Oriole does in the east. They make their appearance about the middle of April in the vicinity of the Humboldt Valley, and begin to build about the 10th or 15th of May. In the willow groves along the tributaries of the Humboldt River and Independence Creek this species was constantly heard during the day. The nest, as described by Dr. Cooper, is "built near the end of a branch, often overhanging the road or house, and constructed of fibrous grasses, horse-hairs, strings, rags, down of plants, wool, and fine bark. Sometimes one or two materials alone are used, such as white horse-hair and cotton twine, which I have found in one instance. These are neatly and closely interwoven in the form of a deep bag, suspended by the edges from the forks of a branch near its end." The nest, as described by Mr. Ridgway, "is very similar in its structure and composition to that of the Baltimore (*I. baltimore*), but it is less frequently pendulous, and seldom, if ever, so gracefully suspended. Its usual position is between upright twigs, near the top of the tree, thus resembling more that of the Orchard Oriole (*I. spurius*), which, however, is very different in its composition." The latter description conforms more nearly to my own observations. Of the great number of nests examined during May and June, very few were similar to those of the eastern Baltimore Oriole as far as the pendulous form is concerned, by far the greater number being more globular and secured between several upright branches, or in the forks of the same. One nest in particular, referred to on a former occasion, was closed over at the top, leaving two openings, one on each side, though near the top. The materials employed consisted chiefly of grasses of several species, and the upper ends were so interwoven in securing the nest to the upright branches as to close that portion entirely. The necessity for this was apparent in this instance, though it was at first considered intentional as the nest was located on the same horizon and only about 8 or 10 feet distant from one occupied by a breeding Hawk (*Buteo swainsoni*), both species appearing until the time of our visit to live in perfect harmony.

A nest similar in some respects is described by Dr. Coues, which, though "suspended from the forked twig of an oak and draped almost to concealment with leaves, had a remarkable peculiarity, being arched over and roofed in at the top, with a dome of the same material as the rest, and had a little round hole in one side just large enough to let the birds pass in." Both instances are probably exceptional, though interesting in illustration of the variety of form adopted.

Scolecophagus cyanocephalus (Wagl.) Caban.—Brewer's Blackbird.

This Blackbird was met with more particularly in the southwestern portion of the State, in the more elevated regions. They frequent the lower valleys during the winter, retiring in the summer to the timbered cañons and higher valleys. On the western coast they are reported by Dr. Cooper as resident as far north as the Columbia.

CORVIDÆ.

Corvus corax carnivorus (Bartr.) Ridgw.—American Raven.

This bird is everywhere more or less abundant, and a permanent resident. Dr. Cooper, in referring to this species, gives the following statement: "I obtained numbers of the raven at Fort Mojave, which, though more brilliant than usual in northern specimens, did not seem to differ enough in size or proportions to separate them as a distinct species. The only approach to Professor Baird's *C. cacalotl* was in the more graduated tail feathers of one, in which the outer were 2.10 inches shorter than the middle, other specimens having them nearer alike. He gives the difference in *C. cacalotl* at 2.30, while in *C. carnivorus* it ranges from 1.60 to 1.90." The Doctor does not consider these specimens a distinct species, although their average size is smaller than the northern specimens, and the plumage, though more lustrous, is due probably to the climatic effects of that region.

Corvus frugivorus Bartr.—Common Crow.

The Crow was found to be rare east of the Sierras by Mr. Ridgway, who noted its occurrence near the Humboldt marshes and at the Truckee Meadows. Along the cliffs, a few miles southeast of Bull Run Mountain, and again in a similar locality, at the southern extremity of Smoky Valley, we found these birds in considerable numbers; their nests being perched in the crevices from one hundred to two hundred feet above the base of the nearly perpendicular walls of rock. None were observed farther north in Nevada, though specimens were seen in California, near Partzwick, just across the line.

Picicorvus columbianus (Wils.) Bp.—Clarke's Nutcracker.

The only locality where specimens were seen during the whole journey was on the northern slope of Mount Nagle; one or two were secured which proved their identity, the flight and habits generally so closely resembling a woodpecker's as to sometimes mislead the most accurate observer at first sight. All the reports given indicate that this species frequents the coniferous regions of the most elevated mountains.

Gymnokitta cyanocephala Max.—Maximilian's Nutcracker; Piñon Jay; Blue Crow.

This species was found rather common throughout that belt of coniferous trees represented by the piñon (*Pinus edulis*), extending more particularly and uninterruptedly from Eureka southward to below Hot Spring Cañon. Again, at the occurrence of the same belt at Mount Nagle and at Mount Magruder, the species was detected, but not so frequently, owing, perhaps, to the rather limited amount of food-supply, the chief source being obtained from the above-named tree, though when this fails, as is the case with the piñon, which does not bear every year, they resort to other berries, as juniper, cedar, &c. Like the preceding, they do not resemble the Crows in habits, but partake more of the nature of true Jays.

Pica rustica hudsonica (Scop.) Baird.—Black-billed Magpie.

Was found rather numerous in the mountainous portions of the lower interior of the State. This species is reported as having been found by nearly all observers throughout the Interior Basin, from the Sierra Nevada eastward. Resident.

Aphelocoma woodhousei (Baird) Ridgw.—Woodhouse's Jay.

Rather common, and frequents the watered cañons of the mountain ranges. Henshaw and Yarrow report it from the eastern portions of the State, while Mr. Ridgway mentions it as abundant on the western slope of the Humboldt Mountains in September. Dr. Coues found it very abundant in Arizona, "being found everywhere, but preferring open hillsides among the scrub-oaks." This bird was found very common in the juniper groves on the western border of the Colorado Plateau in Arizona, about 25 miles south of the Colorado River; they appear to feed upon the berries at that season (October).

Aphelocoma californica (Vig.) Caban.—California Jay.

This variety is reported by Mr. Henshaw to cross the Sierra range, and is found along the eastern slope of the mountains. "It reaches, however, no farther than the foot-hills, but is soon replaced to the east by the closely allied form, the Woodhouse's Jay (*A. woodhousei*)."

ALAUDIDÆ.

Eremophila alpestris (Forst.) Boie.—Shore Lark.

This species* is common over nearly the whole of the area under consideration, and as my own limited experience does not vary from that of Mr. Ridgway's I shall give his remarks entire: "No locality is too barren for it, but, on the contrary, it seems to fancy best the most dry and desert tracts, where it is often the only bird to be seen over miles of country, except an occasional dove (*Zenaidura carolinensis*), or a solitary raven seen at wide intervals. Neither does the altitude appear to affect its distribution, except so far as the character of the ground is modified, since we saw them in July and August on the very summit of the Ruby Mountains, at an altitude of about 11,000 feet, the ground being pebbly, with a stunted and scattered growth of bushes. The small, deep-colored race known as *chrysolæma* was the usual form found in summer, but in winter most of these seemed to have migrated southward, their place being taken by flocks from the north, composed of migratory individuals of the races called *alpestris* and *leucolæma*, of which the former predominated."

In reference to the arid regions of the southern portion of the State I can say that it was rather uncommon, but upon any of the higher elevations upon the sides of which were any moist spots, or springs furnishing sufficient moisture for the growth of a varied flora, this species was always to be found in greater abundance. In the Colorado Valley none were found excepting near the mouth of Virgin River. Dr. Cooper states that he "saw these birds in considerable flocks about Fort Mojave about the end of February, but all of them seem to have left the valley by the end of March."

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* *E. alpestris*, var. *leucolæma*, Coues, represents the pale variety (or race), which breeds on the interior plains, while variety *chrysolæma* is smaller and brighter, and occurs in the southwestern regions into Mexico.

TYRANNIDÆ.

Tyrannus carolinensis (Linn.) Temm.—Kingbird; Bee Martin.

Not common. One specimen only, supposed to be this species, was seen in camp in the southern extremity of Smoky Valley. Mr. Ridgway says of it: "In the rich valley of the Truckee River, in western Nevada, two or more pairs of this familiar eastern bird had their abode among the large cottonwood trees near our camp; in fact this species seemed to be no more rare in that locality than the *T. verticalis*, which, however, was itself far from common. On the eastern border of the Great Basin it was more abundant, being quite as numerous in the Salt Lake Valley as the *T. verticalis*, both frequently nesting in the same grove."

Tyrannus verticalis Say.—Western Kingbird.

Rather more common than *T. carolinensis*, and noticed in various regions presenting more fertility than is ordinarily observed in an extended tour through the State. Was found breeding in June south of the Central Pacific Railroad, in the valleys between Austin, Hot Spring Cañon, and Belmont, in the cottonwood groves.

Myiarchus cinerascens Lawr.—Ash-throated Flycatcher.

"A few were observed among the cottonwoods of the Lower Truckee in July and August, and it was also a not infrequent summer resident in the cañons of the Ruby Mountains, where it was most often observed perched upon a gnarled cedar or mountain mahogany overhanging the top of a rocky gorge or high cliff."—(*Ridgway*.) Dr. Cooper found one specimen at Fort Mojave as early as January 15, and thinks a few may habitually winter in the Colorado Valley. Several specimens were found in the river bottom 11 miles north of the post, but they appeared nowhere as common.

Sayornis sayi (Bonap.) Baird.—Say's Pewee.

"Throughout the country eastward of the Sierra Nevada this interesting bird was found in all suitable places, though it was not abundant anywhere, since it was seldom that more than one pair inhabited a restricted locality."—(*Ridgway*.) Mr. Henshaw obtained a single specimen in September, but thinks it is common during the summer. The species is distributed over the northern portion of America, and, according to Richardson, as far as latitude 60°. Dr. Cooper considers it a mere winter visitor in the southern and western portions of California, where he saw none after March.

Contopus borealis (Swains.) Baird.—Olive-sided Flycatcher.

This species has been found a common summer resident, but its distribution is confined to the more elevated coniferous regions, its sout ern range being in accordance with the survival or presence of that zone, at least as far south as Belmont.

Contopus richardsoni (Swains.) Baird.—Western Wood Pewee.

Common throughout the northern and more timbered regions, but rather rare in the southern interior. It was again met with at Spring Mountain, where it appeared abundant about the beginning of September.

Empidonax difficilis Baird.—Western Yellow-bellied Flycatcher.

This rare species may properly be included in the present list, as its occurrence on the eastern slope of the Sierra Nevada is recorded by Mr. Ridgway. The same writer says also: "It is with little hesitation that we consider this bird as distinct specifically from *E. flaviventris.* Not only are there very conspicuous and constant differences in proportions and colors (especially the former), but numerous observers have noticed remarkable and important peculiarities in the nesting habits, the present species almost invariably building its nest in cavities, either of stumps, trees, or rocks, or on beams inside of buildings, a habit not yet noticed in *E. flaviventris*, nor indeed in any other species of the genus." Dr. Cooper says, "the differences in the two races seem to be wholly in shades of color and size, and not in proportions, as formerly supposed," which is a mistaken view according to the observations of Mr. Ridgway.

Empidonax pusillus (Swains.) Baird.—Little Flycatcher.

Common throughout the watered valleys. Was especially abundant along the Humboldt River and the tributaries from the north, frequenting the willow groves. Dr. Cooper noted its occurrence in the Colorado Valley, at Fort Mojave, as early as the 1st of May, where he found several inhabiting a dark dense thicket. Yarrow and Henshaw found it sparingly in Eastern Nevada.

Empidonax hammondi (Xantus) Baird.—Hammond's Flycatcher.

In noting this bird Mr. Ridgway says "it was not met with anywhere as a summer resident, but during its autumnal migration was found to be very common on the East Humboldt Mountains." Its occurrence in the Colorado Valley is noted by Dr. Cooper, who states that he obtained but one specimen at Fort Mojave on May 20.

Empidonax obscurus (Swains.) Baird.—Wright's Flycatcher.

This species was found rather common at Bull Run Mountain as early as May 25, and again at Prospect Hill in June. Dr. Cooper found it at Fort Mojave about April 1, and a few afterwards until May 25. Mr. Ridgway mentions it as more abundant in the aspen copses of the high cañons of the lofty Toyabe range near Austin than anywhere else, while Yarrow and Henshaw found it rather scarce in Eastern Nevada.

Pyrocephalus rubineus mexicanus (Scl.) Coues.—Vermilion Flycatcher.

The probable discovery of this bird at Fort Mojave on May 24, its capture in the Colorado Valley, at latitude 34°, on the 18th of April, and the statement by Heerman that it is quite common at Fort Yuma during the spring, is sufficient evidence to consider it a visitant species.

"The North American species, originally supposed to be identical with that inhabiting South America, has lately been described by Dr. Sclater as distinct." Dr. Cooper further suggests that "it may, however, perhaps be fairly questioned whether here, as in many other instances, there is anything more than a slight difference produced by peculiarities of climate, &c."

TROCHILIDÆ.

Trochilus alexandri Bourc and Muls.—The Black-chinned Hummingbird.

Was found in the valleys of the northern interior of the State. Dr. Cooper did not find it at Fort Mojave, but states that it has since been obtained in the Colorado Valley by Mr. Holder, on the 20th of March. The species closely resembles the Eastern Ruby-throat (*T. colubris*).

Calypte costæ (Bourc.) Gould.—Costa's Hummingbird.

Was observed at Fort Mojave by Dr. Cooper, but is not common; is said to be extremely abundant at Cape Saint Lucas, occurring also on the eastern side of the Gulf of California, at Guaymas, &c.

Selasphorus platycercus (Swains.) Bonap.—Broad-tailed Hummingbird.

Observed on the Ruby Mountains by Mr. Ridgway, where it was found in company with *Stellula calliope.*

Selasphorus rufus (Gmel.) Aud.—Rufous Hummingbird.

Found by Mr. Ridgway among the sun-flowers (*Helianthus*) in the Valley of the Truckee, in August; also, later in the season, in the cañons of the West Humboldt Mountains.

Stellula calliope Gould.—Calliope Hummingbird.

This species was noticed at Prospect Hill, and again in Owen's Valley, California, where it was found breeding in July. One nest with eggs was found perched over and within a short distance of a noisy mountain stream, where it was no doubt frequently subjected to the dashing spray. Mr. Ridgway found this bird on the Ruby and East Humboldt Mountains, at an altitude of from 7,000 to 10,000 feet.

CYPSELIDÆ.

Cypselus saxatilis Woodh.—White-throated Swift.

Rather common in the more elevated regions, building in and about the fissures and projections of cliffs; was noticed again in the upper portion of the Black Cañon of the Colorado Valley, in September. Dr.

Cooper considers it probable that this species winters in the cañons, though he saw none at Fort Mojave until May, probably stragglers from their favorite mountains.

Cypseloides niger borealis (Kennerly) Ridgw.—Black Swift.

This bird was found in the Valley of the Truckee by Mr. Ridgway, in a mutilated form, consisting of the sternum, wings, feet, and tail, which were, as it is stated, the remains of an individual which had been devoured by a hawk or an owl. This bird flies at great elevation, and, as Dr. Cooper says, "like other swifts, flying habitually almost out of sight, and rarely coming near the ground, except in cloudy weather, it would very readily escape the attention of travellers in the West, however abundant it might be."

Chætura vauxi (Towns.) De Kay.—Vaux's Swift.

"During our sojourn at the Truckee Reservation, near Pyramid Lake, in May and June, 1868, we saw, nearly every evening, but never until after sundown, quite a number of small Swifts, which must have been this species; but they always flew at so great a height that we found it impossible to obtain a specimen in order to determine the species."—(*Ridgway.*) This bird is recorded from California by Dr. Cooper, and Dr. Townsend also found it on the Columbia River, and it is more than probable that, from its geographical range, it may yet be found within the State limits.

CAPRIMULGIDÆ.

Phalænoptilus nuttalli (Aud.) Ridgw.—Poor-will.

This species, unlike the Eastern *Caprimulgus vociferus*, is, according to both Mr. Ridgway and Dr. Cooper, an inhabitant of the sage-brush country. I met with the bird several times, the first locality being in the valley west of Hot Spring Cañon, on the road to Belmont. They appeared rather frequently in the vicinity of Green Mountain district and north of Mount Magruder. According to Mr. Ridgway, both sexes incubate.

Chordeiles popetue henryi (Cass.) Allen.—Western Nighthawk.

Was found south of Eureka, on the northern slopes of Prospect Hill. Mr. Ridgway also found this species a common summer inhabitant over the region traversed by him.

Chordeiles acutipennis texensis (Lawr.) Ridgw.—Texan Nighthawk.

The first of this species was observed by Dr. Cooper at Fort Mojave on the 17th of April, soon after becoming quite numerous, hunting in company after sunset, and hiding during the day on the ground under low bushes. They flew like *C. popetue*, but sailed rather more in small circles.

PICIDÆ.

Picus villosus harrisi (Aud.) Allen.—Harris's Woodpecker.

Not uncommon in the timbered districts over the greater portion of the State. None were seen in the southern regions, however, although Dr. Kennerly notes it as descending to the eastern branches of the Colorado River in winter.

Picus pubescens gairdneri (Aud.) Coues.—Gairdner's Woodpecker.

Mr. Ridgway states this species to be unaccountably rare, a few being found in September among the thickets by one of the streams flowing from the lofty Clover Mountains into the Upper Humboldt.

Picus scalaris Wagl.—Texan Woodpecker.

Abundant in the Colorado Valley, and sometimes seen on the bushes covering the neighboring mountains. In habits they are the exact representatives of *P. nuttalli*, which they so much resemble.—(*Cooper.*)

Xenopicus albolarvatus (Cass.) Baird.—White-headed Woodpecker.

Was found common by Mr. Ridgway on the eastern slopes of the Sierra Nevada, near Carson City, during the winter, keeping entirely among the pines, though sometimes coming down to the lower edge of the woods.

Picoides arcticus (Swains.) Gray.—Black-backed Three-toed Woodpecker.

One specimen only was found by Mr. Ridgway near Carson City in February.

Sphyrapicus varius nuchalis Baird.—Red-naped Woodpecker.

Rather common in favorable localities throughout the northern regions. Dr. Cooper obtained a female specimen at Fort Mojave in February, which he thinks may have wandered in a storm from the mountains, being the only one he saw.

Sphyrapicus varius ruber (Gmel.) Ridgw.—Red-breasted Woodpecker.

Occurs chiefly on the western slope of the Sierra Nevada, though Mr. Ridgway is under the impression that he saw it once near Carson City. Mr. Henshaw has obtained it at Lake Tahoe since the time of the former's observations.

Sphyrapicus thyroideus (Cass.) Baird.—Black-breasted Woodpecker.

Found throughout the elevated coniferous regions. This species was formerly considered a species distinct from *S. williamsoni*, when in fact they are female and male of the same species, a fact first pointed out by Mr. Henshaw in 1874.* Dr. Cooper found his first specimen a straggler to the Colorado Valley in the winter of 1861.

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* American Naturalist, vol. viii, p. 242.

Centurus uropygialis Baird.—Gila Woodpecker.

At Fort Mojave Dr. Cooper "found this Woodpecker abundant in winter, when they fed chiefly on the berries of the mistletoe (*Viscum*), and were rather shy. They had a loud note of alarm, strikingly similar to that of *Phainopepla nitens*, which associated with them in the mistletoe boughs."

Melanerpes torquatus (Wils.) Bonap.—Lewis's Woodpecker.

Not noticed by Dr. Cooper in the southern portion of the State, although it is not an uncommon species throughout the wooded areas of the northern part.

Colaptes auratus (Linn.) Swains.—Yellow-shafted Flicker.

Mentioned as probably occurring, by Mr. Ridgway, who noticed several individuals, but was unable to definitely determine. Several feathers shot from one specimen presented the pure bright gamboge-yellow, without the faintest trace of orange. Whether this may or may not have been *hybridus*, it is impossible to state with certainty, though it is more than probable that it was the typical *auratus*, both on account of the geographical considerations and the absence of the orange tint, which is seldom, if ever, absent in *hybridus*.

Colaptes auratus hybridus (Baird) Ridgw.—"Hybrid" Flicker.

A specimen obtained in Washoe Valley by Mr. Ridgway has, according to this observer, the "general appearance of typical *mexicanus*, having ashy throat and scarlet 'moustaches,' but occiput with a distinct scarlet crescent, and the red of the remiges and rectrices inclining decidedly to orange." Dr. Cooper found several specimens at Fort Mojave which he considers a mixture of *mexicanus* and *auratus*, including as one variety the form described by Audubon as *C. ayresii*, synonymous with the above.

Colaptes auratus mexicanus (Swains.) Ridgw.—Red-shafted Flicker.

Common. Along the Colorado, Dr. Cooper found this bird very shy, probably on account of their being much hunted by the Indians for their bright feathers.

ALCEDINIDÆ.

Ceryle alcyon (Linn.) Boie.—Belted Kingfisher.

Common in favorable localities. Mr. Ridgway found it resident in the lower valleys, but only a summer visitant in the mountains.

Ceryle americana cabanisi (Tschudi) Coues.—Texan Kingfisher.

The occurrence of this diminutive species along the southern border of the United States, and its presence in the Colorado Valley at several points between Fort Mojave and Fort Yuma, where Dr. Coues noted it, may be sufficient to warrant us in predicting its probable capture within the limits of the State, the general uniformity of the physical characters of the valley aiding greatly in the northward range of the more southern forms.

CUCULIDÆ.

Geococcyx californianus (Lesson) Baird.—Chaparral Cock; Road-runner.

I found this bird only in the Colorado Valley in the vicinity of Fort Mojave, where it was not of uncommon frequency. It appeared to resort to the scattering underbrush of the banks, apparently in search of food; not shy, and could be approached to within 20 or 30 paces.

Coccyzus americanus (Linn.) Bp.—Yellow-billed Cuckoo.

Not uncommon in the timbered regions of either the valleys or the mountains. In referring to the peculiar notes of this bird, Dr. Cooper says that on account of it this Cuckoo is known in the East as "Koubird." Dr. Coues, also, in treating the same subject, says that the "syllables koo-koo-koo, indefinitely repeated, are probably uttered more frequently during the atmospheric changes preceding falling weather, and have given rise to the name of 'Rain Crow,' by which both our species are universally known to the vulgar."

In the woods of Pennsylvania I have frequently heard this bird produce the sound just referred to, and also another, closely resembling the sound as of hammering upon a pine board, though very distant. This species, as well as *erythrophthalmus*, is called "Rĕgafogel" (Rainbird) by the Pennsylvania Germans, and it is generally believed, even among many of the more intelligent persons, that the utterance of the peculiar notes is indicative of a change of weather.

STRIGIDÆ.

Asio americanus (Steph.) Sharpe.—American Long-eared Owl.

This species may be called a very common one, as it occurs throughout the bottom lands amongst the thickets in every favorable locality. First noticed on the 10th of May amongst the willows near Carlin, and at various localities west and south of that place.

Asio accipitrinus (Pall.) Newton.—Short-eared Owl.

Have not found this Owl reported from the northern portions of the State, although it is a more northern species than *A. americanus*, and a winter visitant, and as it is reported from the Mojave River by Heerman, it will, no doubt, through future investigations, be found a regular visitor.

Scops asio (Linn.) Bp.—Little Screech Owl.

Reported from Fort Mojave, where Dr. Cooper obtained one specimen, which differed from a California example only in being rather smaller and of a paler gray, adding, "as if its hue was affected by the hot, dry climate, although it never exposed itself to the sunshine. It d not, therefore, present the 'darker' color and more numerous bett defined transverse lines below, being scarcely more than light ash-co in any part." The Doctor further remarks, "Being thus unlike Cass *S. McCallii*, I have considered it only a pale variety of *S. asio*, althou its southern locality would lead us to expect to find it to be *S. McCal* if indeed that be a distinct species." Mr. Ridgway thinks this w doubtless *S. trichopsis* Wagl.

Nyctale acadica Gmelin.—The Acadian Owl; Saw-whet Owl.

But a single individual of this species was obtained by Mr. Ridgwa in Thousand Spring Valley. It is more common in the northern p tions of the United States, and as it is nocturnal, but little has be learned of its habits.

"I have seen in the museum of the German Academy of Natu Sciences, of San Francisco, a specimen of this owl, brought fr Nevada, close to the boundary of California, about latitude 39°, altitu 7,000 feet."—(*Cooper*.)

Speotyto cunicularia hypogœa (Bonap.) Ridgw.—Burrowing Owl.

This Owl was found only on the southern slope of the hills near An lope Creek, about 60 miles north of Battle Mountain, where two in viduals were seen flying from a deserted prairie-dog burrow, one which was subsequently shot and identified.

Micrathene whitneyi (Cooper) Coues.—Whitney's Pigmy Owl.

This species was discovered by Dr. Cooper at Fort Mojave in 18 and is probably the smallest Owl known. From the doctor's descri tion we learn that it is arboreal, and partly diurnal, and feeds upon i sects. It has not been reported from the same locality by any lat observers, though several specimens are reported by Captain Bendi and Mr. Henshaw as having been secured in Arizona.

FALCONIDÆ.

Hierofalco mexicanus polyagrus (Cass.) Ridgw.—Prairie Falcon.

Mentioned by Mr. Ridgway as a rather common species througho the upper interior portions of the State; saw a mounted specimen a Carlin, which was said to have been shot near that place.

Falco peregrinus nævius (Gmel.) Ridgw.—American Peregrine Falcon Duck Hawk.

Was found by Mr. Ridgway at Pyramid Lake and along the Lowe Truckee, where he secured a specimen.

Æsalon columbarius (Linn.) Kaup.—Pigeon Hawk.

Not common in the northern portion of the State. Dr. Cooper secured a specimen at Fort Mojave in winter, which differed from the

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Archibuteo lagopus sancti-johannis (Gmel.) Ridgw.—American Rough-legged Hawk.

According to Mr. Ridgway is common in the fertile valleys, and appears resident in the western portion of the State.

Aquila chrysaëtus canadensis (Linn.) Ridgw.—Golden Eagle.

This species is not uncommon in the elevated mountain regions. They were observed at Bull Run Mountain, Mount Magruder, and other similar localities. Mr. Ridgway noticed them from the Sierra Nevada eastward, usually finding them in pairs.

Haliæëtus leucocephalus (Linn.) Savig.—Bald Eagle; Gray Eagle.

Like the preceding this bird was found in the vicinity of Pyramid Lake, where, according to Mr. Ridgway, it was rare. Dr. Cooper quotes Gambel as saying that these birds were "held sacred by the Indians, which will in a measure account for their abundance and protection by the natives." This species is kept and protected by some of the Pueblo Indians, and the Dakota and Absaroka Indians when hunting this eagle for its feathers, seldom ever kill one, but catch them by selecting an elevated peak where they hide in a cavity, which is then covered over with grass and brush, upon which a rabbit or some other animal is secured, so that when the eagle descends to grasp its quarry the bird is seized by the legs and held until the confederates arrive, when the choice feathers are plucked and the bird liberated.

CATHARDIDÆ.

Cathartes aura (Linn.) Illig.—Turkey Buzzard.

Arrives in the middle regions about the second or third week in March, after which time it is common. Was also observed in the Colorado Valley from Fort Mojave northward.

COLUMBIDÆ

Columba fasciata Say.—Band-tailed Pigeon.

The only notice of this species as referring to the region under consideration is that given by Mr. Ridgway, viz: "On the 19th of November, 1867, we saw a single individual of what must have been this species, flying to the southward over the Truckee Meadows. Its appearance and size was very much that of the common House Pigeon, but from the manner of its flight it was evidently a wild bird."

Ectopistes migratoria (Linn.) Sw.—Passenger Pigeon.

This bird is considered an occasional straggler by Mr. Ridgway, only one stray individual having been captured by him in the West Humboldt Mountains in September.

Zenaidura carolinensis (Linn.) Bp.—Mourning Dove.

Generally distributed over the whole State. It is curious to see the great numbers gathering about the springs about sundown, even in the most isolated localities. At one spring on the southern slope of Gold Mountain, where the water was extremely brackish and scarcely exceeded two bucketsful in quantity, the ground about the depression was literally alive with these birds. In the northern parts of the country they are abundant about the settlements, frequenting more particularly the corrals.

Chamæpelia passerina (Linn.) Swains.—Ground Dove.

The probable occurrence of this species in the southern portion of the State is mentioned by Dr. Cooper in the following words: "This pretty little dove, which is common in the South Atlantic States, Mexico, and the West Indies, undoubtedly visits Fort Yuma, and I have heard of what I supposed to be the same as far north in the Colorado Valley as Fort Mojave, latitude 35°, though I did not myself see them there."

TETRAONIDÆ.

Canace obscura (Say) Bp.—Dusky Grouse.

Appears to be strictly confined to the elevated coniferous regions of the higher ranges. Though seldom found in the thick forests, this species frequent the open areas amongst the scattered trees and brush.

Pediœcetes phasianellus columbianus (Ord) Coues.—Common Sharp-tailed Grouse.

Was found in moderate numbers at Bull Run Mountains. Mr. Ridgway also records it from the Upper Humboldt Mountains, where it is known as the "Prairie Chicken."

Centrocercus urophasianus (Bp.) Swains.—Sage Cock.

The only locality where this bird was found at all common was near Belmont. Specimens were also shot at Hot Creek Cañon. They appear to frequent the sage-brush, upon the leaves of which they feed, often causing the meat to be unfit for use.

PERDICIDÆ.

Oreortyx picta plumifera (Gould) Ridgw.—Plumed Quail.

Was found by Mr. Ridgway in Western Nevada, where it was rather rare.

Lophortyx californica (Shaw) Bp.—Californian Quail.

Reported from Fort Mojave by Dr. Cooper, where it breeds.

Lophortyx gambeli Nutt.—Gambel's Quail.

Numerous at Fort Mojave.—(*Cooper.*)

ARDEIDÆ.

Ardea herodias Linn.—Great Blue Heron.

Is reported abundant about all bodies of water affording it a plentiful supply of food. Mr. Ridgway also found it breeding at Pyramid Lake.

Herodias alba egretta (Gmel.) Ridgw.—American Egret; White Heron.

Mr. Ridgway saw a single individual on the Lower Truckee; our stay in the localities favorable to the Herons was exceedingly short, and few of this and kindred genera were seen.

Nyctiardea grisea nævia (Bodd.) Allen.—Black-crowned Night Heron.

Was found abundant in the Valley of the Humboldt, at Battle Mountain.

Botaurus lentiginosus (Montag.) Steph.—American Bittern.

Apparently resident in the lower marshy valleys of the western interior portions of the State.

Ardetta exilis (Gmel.) Gray.—Least Bittern.

One individual of this diminutive Heron was seen in May, among the willows along the Lower Truckee, the one in question being startled by the approach of our boat.—(*Ridgway.*)

CICONIIDÆ.

Tantalus loculator Linn.—Wood Ibis.

I noticed this bird only in the Colorado Valley, opposite Fort Mojave, where the sloping bank was covered with brush and cottonwood trees to within a short distance of the water.

IBIDIDÆ.

Plegadis guarauna (Linn.) Ridgw.—White-faced Glossy Ibis.

Was observed by Mr. Ridgway in September in the Humboldt Marshes, where it was one of the most abundant water-birds.

CHARADRIIDÆ.

Oxyechus vociferus (Linn.) Reich.—Killdeer.

This bird was common along all streams throughout the northern half of the State. Mr. Ridgway says it is resident, but more numerous in summer than in winter.

Gallinago media wilsoni (Temm.) Ridgw.—Wilson's Snipe.

Is generally abundant. A single individual was secured at the head of Armagosa River—a saline stream of several hundred yards in length in summer—in company with several Green-wing Teals (*Nettion carolinensis*). This instance is noteworthy from the fact that the locality is surrounded by arid sandy deserts for many miles, the nearest spring of any consequence being over 70 miles distant, and the Colorado River, in a direct line across Spring Mountain, about 150.

SCOLOPACIDÆ.

Actodromas bairdi Coues.—Baird's Sandpiper.

Reported from Pyramid Lake and the Humboldt Marshes by Mr. Ridgway.

Actodromas minutilla (Vieill.) Bp.—Least Sandpiper.

Vicinity of Pyramid Lake in May, and at the Humboldt Marshes in August.—(*Ridgway.*)

Pelidna alpina americana Cass.—Red-backed Sandpiper.

Found by Mr. Ridgway among the large flocks of Sandpipers and other small waders in the vicinity of Pyramid Lake in May.

Ereunetes pusillus (Linn.) Cass.—Semipalmated Sandpiper.

Found in the valleys of the northern portion of the State. Was also observed on the Colorado below the ruins of Callville.

Rhyacophilus solitarius (Wils.) Cass.—Solitary Sandpiper.

From all observations thus far noted this species is very rare.

Symphemia semipalmata (Gmel.) Hartl.—Willet.

A specimen in a small collection at Carlin was said to have been shot at the Humboldt River, near the town. Mr. Ridgway found it numerous on the southern shore of Salt Lake, and it is more than probable that the species occurs along the Humboldt Valley from the east westward.

Numenius longirostris Wils.—Long-billed Curlew.

Appears common in the marshy districts. Was found breeding in Independence Valley; and a dead specimen was found at Rose Cañon, on the Telescope Range, California, where it had probably perished for want of water after a long flight in the hot atmosphere of the surrounding country.

PHALAROPODIDÆ.

Steganopus wilsoni (Sab.) Coues.—Wilson's Phalarope.

Specimens were obtained by Mr. Ridgway at Pyramid Lake, where they was shot from a flock of Sandpipers.

RECURVIROSTRIDÆ.

Recurvirostra americana Gmel.—American Avocet.

Generally common about the interior lakes. Was also found rather common on the Colorado River near the mouth of an alkaline stream several miles west of the ruins of Callville.

Himantopus mexicanus (Müll.) Ord.—Black-necked Stilt.

This species is found nearly always in the same localities as the Avocet, though in less numbers.—(*Ridgway.*) Several individuals were obtained in the Colorado Valley below the Black Cañon.

RALLIDÆ.

Rallus virginianus Linn.—Virginia Rail.

Two or three specimens of this Rail were seen in May among the sedges bordering a pond near Pyramid Lake.—(*Ridgway.*)

Porzana carolina (Linn.) Baird.—Sora Rail.

Common in the northern portion of the State in suitable localities. Also found near the great bend of the Colorado River.

Porzana noveboracensis (Gmel.) Baird.—Little Yellow Rail.

"On several occasions and at widely-distant localities we met with a small Rail of a black color, which must have been this species, unless it should prove to be one at present undescribed. It was first seen on the 5th of September, 1868, in Ruby Valley."—(*Ridgway.*)

Fulica americana Gmel.—American Coot.

Found to be rather common during May and June, when it was observed in the Humboldt Valley, in a marsh.

GRUIDÆ.

Grus canadensis (Linn.) Temm.—Sandhill Crane.

This species was found very abundant in the wet grassy meadows in Independence Valley, where they evidently breed. On September 30 they were again seen on the Colorado River above the Black Cañon, and, when disturbed, rose at once and followed the course of the river southward.

ANATIDÆ.

Olor buccinator (Rich.) Wagl.—Trumpeter Swan.

Mr. Ridgway found Swans exceedingly numerous in the vicinity of Pyramid Lake, but as he obtained no specimens, there is no certainty whether they were the Trumpeter or Whistler (*O. americanus*).

Chen hyperboreus albatus (Cass.) Ridg.—Lesser Snow Goose.

This Goose, almost universally known as the "White Brant," was an abundant winter visitant to the lakes of the Great Basin.—(*Ridgway.*)

Bernicla canadensis (Linn.) Boie.—Canada Goose.

This species was the only one of the genus found breeding in the interior by Mr. Ridgway, where it remained throughout the year about the lakes.

Bernicla canadensis hutchinsi (Sw. and Rich.) Woodh.—Hutchins's Goose.

This miniature of the Canada Goose was an abundant winter visitant in Western Nevada, but it was not seen anywhere in summer, when all had gone northward to breed.—(*Ridgway.*)

Bernicla nigricans (Lawr.) Cass.—Black Brant.

A rare winter visitant to Pyramid Lake, where Mr. Ridgway observed it, but secured no specimens.

Dendrocycna fulva (Gmel.) Burm.—Fulvous Tree Duck.

Several specimens obtained at Washoe Lake, by Mr. H. G. Parker.

Anas boscas Linn.—Mallard.

Common in all favorable localities.

Chaulelasmus streperus (Linn.) Gray.—Gadwall.

Mr. Ridgway found this to outnumber all the other species during the breeding season.

Dafila acuta (Linn.) Bp.—Pintail.

Not abundant, but observed in November at the Truckee Meadows, and in December near Pyramid Lake. Not seen during breeding-season.—(*Ridgway.*)

Mareca americana (Gmel.) Steph.—Baldpate.

A rather common summer resident.—(*Ridgway.*)

Spatula clypeata (Linn.) Boie.—Shoveller.

Common at Pyramid Lake in May.—(*Ridgway.*)

Querquedula discors (Linn.) Steph.—Blue-winged Teal.

Rather common in May at Pyramid Lake, where breeding in the meadows.—(*Ridgway.*)

Querquedula cyanoptera (Vieill.) Cass.—Cinnamon Teal.

This handsome species was common, though not abundant, throughout the West, both in the Sacramento Valley and in the interior.—(*Ridgway.*)

Nettion carolinensis (Gmel.) Baird.—Green-winged Teal.

According to his report, Mr. Ridgway obtained this Duck on Antel

Island, Great Salt Lake, Utah. Quite a number of specimens were obtained at Grapevine Springs, near Spring Mountain, where the Pai-Ute Indians had erected brush tents, from which they could shoot such water-fowl as frequented the locality.

Aix sponsa (Linn.) Boie.—Wood Duck; Summer Duck.

One pair of this superb Duck was seen in July, among the cottonwoods of the Truckee.—(*Ridgway.*)

Fulix marila (Linn.) Baird.—Scaup Duck.

Winter visitant to Pyramid Lake.—(*Ridgway.*)

Fulix affinis (Eyt.) Baird.—Little Blackhead.

Winter visitant to Pyramid Lake.—(*Ridgway.*)

Fulix collaris (Donov.) Baird.—Ring-billed Blackhead.

Pyramid Lake in December.—(*Ridgway.*)

Æthyia vallisneria (Wils.) Boie.—Canvas-back.

Abundant during the winter at Pyramid Lake and the marshes. Breeds in the same locality.

Æthyia americana (Eyt.) Bp.—Redhead.

Mr. Ridgway says: "In winter this is an abundant species on the lakes of the Great Basin. It and the preceding species are frequently used by the Paiute Indians in making very artistic and elaborate decoys, which have a body of bent and twisted dry *tules* (*Scirpus*), with the skin stretched over it, the head prepared and poised in a style equal to that of the most accomplished taxidermist. The floating decoy is anchored by a stone tied to a string, the other end of which is fastened to the bill."

Clangula glaucium americana (Bp.) Ridgw.—American Golden-eye.

Pyramid Lake in December.—(*Ridgway.*)

Clangula albeola (Linn.) Steph.—Butterball; Bufflehead.

Winter resident on the lakes and larger rivers of the interior.—(*Ridgway.*)

Erismatura rubida (Wils.) Bp.—Ruddy Duck.

Mr. Ridgway obtained but a single individual (♀) at Pyramid Lake in December, being the only one seen.

Mergus merganser americanus (Cass.) Ridgw.—American Sheldrake.

Truckee and Carson Rivers, during the winter.—(*Ridgway.*)

Mergus serrator Linn.—Red-breasted Sheldrake.

Truckee River and Pyramid Lake, in December.—(*Ridgway.*)

Lophodytes cucullatus (Linn.) Reich.—Hooded Sheldrake.

Occasionally met with in the wooded valleys of the Truckee and Carson Rivers, but it seemed to be rare.—(*Ridgway.*)

PELECANIDÆ.

Pelecanus erythrorhynchus Gmel.—American White Pelican.

Found in the interior of the State. Was noticed again opposite Fort Mojave in September, and on the Colorado River below Ft. Yuma in December, where they are probably resident.

GRACULIDÆ.

Phalacrocorax dilophus (Sw. & Rich.) Nutt.—Double-crested Cormorant.

A specimen of this bird existed in a small collection at Carlin, which was said to have been shot near that locality in the marshes at the mouth of Maggie Creek. Said to occur at Pyramid Lake and along the lower portion of the Truckee River, where Mr. Ridgway found this the only species of the family.

Larus californicus Lawr.—California Gull.

Mr. Ridgway mentions this species as the only Gull found in the Great Basin during summer, but entirely absent in winter, when its place is supplied by *L. delawarensis.*

Larus delawarensis Ord.—Ring-billed Gull.

Was observed only as a winter sojourner at Pyramid Lake, being entirely absent from there in summer.—(*Ridgway.*)

Sterna regia Gamb.—Royal Tern.

More or less common in May at Washoe Lake, and near Pyramid Lake, and in September at the Humboldt Marshes.—(*Ridgway.*)

Sterna forsteri Nutt.—Forster's Tern.

Common throughout the summer in the vicinity of Pyramid, Ruby, and Franklin Lakes, and the Humboldt Marshes.—(*Ridgway.*)

PODICIPIDÆ.

Æchmophorus occidentalis (Lawr.) Coues.—Western Grebe.

According to Mr. Ridgway, this species appears a permanent resident at Pyramid Lake. The specimen in his collection was found "snowbound" in the sage-brush near Carson City, "being discovered by its tracks in the deep snow, where it had scrambled along for a hundred yards or more. It was headed toward the Carson River, and had evidently come from Washoe Lake, about five miles distant, and becoming exhausted by the long flight had fallen to the ground." Mr. Henshaw has also obtained this species in Nevada since Mr. Ridgway's visit t that region.

Podiceps holbölli Reinh.—American Red-necked Grebe.

Quite numerous in August and September in Franklin Lake.—(*Ridgway.*)

Dytes nigricollis californicus (Heerm.) Ridgw.—American Eared Grebe.

A constant resident, and was usually found in localities with *Æchmophorus occidentalis.*—(*Ridgway.*)

Podilymbus podiceps (Linn.), Lawr.—Thick-billed Grebe.

This common Grebe was a resident species in all suitable localities.—(*Ridgway.*) Several individuals were observed on the Humboldt River at Battle Mountain, and again at Carlin Station. At the latter locality two mounted specimens were found in a saloon, which were said to have been secured during the previous summer.

APPENDIX.

The nomenclature adopted in the present paper is based upon the catalogue just issued from the Smithsonian Institution by Mr. Ridgway, a more extended notice of which will be found under his name in the accompanying bibliography.

BIBLIOGRAPHY.

The following list comprises the chief publications relating either directly or indirectly to the birds of Nevada. Other titles might be added treating of the birds of the adjacent States and Territories, though in none of them do we find any special information regarding the geographic range of species which might bring them within the limits as rare or occasional visitors.

1853. Baird, S. F. Exploration and Survey of the Valley of the Great Salt Lake of Utah, including a reconnaissance of a new route through the Rocky Mountains. By Howard Stansbury, Captain Corps of Topographical Engineers, U. S. Army. Printed by order of House of Representatives of the United States. Washington: Robert Armstrong, Public Printer, 1853, 8vo. ill. > Birds. pp. 314-325.

Treats of thirty-one species, and is of additional interest as recording the second instance of the capture, within the United States, of a South American duck, *Pterocyanea rafflesii* = (*Querquedula cyanoptera.*) At the time of exploration Nevada formed part of Utah, and as some of the species referred to in the work are mentioned as occurring over this territory, Oregon, California, &c., the portion now constituting Nevada was evidently intended as relates to geographical distribution.

1861. Baird, S. F. Report upon the Colorado River of the West, explored in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of Topographical Engineers, under the direction of the Office of Explorations and Surveys, A. A. Humphreys, Captain Topographical Engineers, in charge. By order of the Secretary of War. Washington: Government Printing Office, 1861. 4to. ill. > List of Birds collected on the Colorado Expedition. Part v, pp. 5, 6.

Consists of a list of fifty-five species, found principally in the Colorado Valley from Fort Yuma to the Big Cañon.

1869. COOPER, J. G. Some recent additions to the Fauna of California. < Proc. Cal. Acad. Sci., v, pt. 1, for 1868, 1869, pp. 3-13.

Reviews list of birds recently added to the fauna, and mentions some found in the Colorado Valley.

1870. COOPER, J. G. Geological Survey of California, J. D. Whitney, State Geologist. Ornithology, Volume I. Land Birds. Edited by S. F. Baird, from the manuscript and notes of J. G. Cooper. Published by authority of the Legislature. 1870. 1 vol. large 8vo. 1 p. l., pp. xi, 591, ill.

Account of the land birds of the State. The notes on species observed at Fort Mojave are of interest as illustrating the northern range of many of the Colorado Valley forms.

1870. COOPER, J. G. The Fauna of California and its Geographical Distribution. < Proc. Cal. Acad. Sci., iv, pt. ii, 1870, pp. 61-81.

This paper was read Sept. 6, 1869; on p. 61, notes 21 spp. found in the Colorado Valley from the Great Bend, Lat. 36°, to the mouth of the river, at Lat. 32°. On pp. 74-76 is another list, which might have been greatly increased had the author's residence in the valley been prolonged.

1874. BAIRD, S. F., Brewer, T. M., *and* Ridgway, R. A History of North American Birds, by S. F. Baird, T. M. Brewer, and R. Ridgway. Land Birds. Vol. I [—III]. Boston. Little, Brown and Company. 1874. 3 vols. sm. 4to. Vol. I, pp. xxviii, 1-596, vi, ill. and pll. Vol. II, 3 p. ll., pp. 1-590, vi, ill. and pll. Vol. III, 3 p. ll., pp. 1-560. 1 l., ill. and pll.

A valuable history of the N. A. Birds, based upon the great amount of MS. contained in the Smithsonian Institution in the form of correspondence, reports, field notes of collectors, &c. Frequent reference is made to the area under consideration, of species, illustrative of geographical distribution, migration, &c. The volumes relating to the Water Birds have not yet been published, but are now, I learn, in the hands of the printer.

1874. COUES, ELLIOTT. Department of the Interior. United States Geological Survey of the Territories, F. V. Hayden, U. S. Geologist-in-Charge. Miscellaneous Publications—No. 3. Birds of the Northwest: A Hand-book of the Ornithology of the region drained by the Missouri River and its tributaries. By Elliott Coues, Captain and Assistant Surgeon U. S. Army. Washington: Government Printing Office. 1874. 1 vol. 8vo. pp. i-xi., 1-791.

A well known and valuable work upon the birds found chiefly in that region extending from the Mississippi River to the Rocky Mountains, and from the State of Kansas to the Northern Boundary of the United States. The work is additionally valuable on account of the complete synonymatic lists, notes on geographic distribution, and finally the monographic treatises of three families, viz: *Laridæ*, *Colymbidæ*, and *Podicipedidæ*, which are made the subjects of special study.

1874. HOFFMAN, W. J. [Notice of the breeding habits of *Buteo swainsoni* and *Icterus bullocki* in Nevada.] < N. Am. Birds [Baird, Brewer, and Ridgway], II 1874, p. 269, 270.

[From author's MS. report to the Chief of U. S. Geograph. Surveys West of 100th Meridian.]

1874. YARROW, H. C., *and* Henshaw, H. W., Engineer Department, U. S. Army. Geographical and Geological Explorations and Surveys west of the one hundredth meridian. First Lieut. [now Captain] Geo. M. Wheeler, Corps of Engineers, in charge. Report upon Ornithological Specimens collected in the years 1871, 1872, and 1873. Washington: Government Printing Office. 1874. 8vo. pamph. 1 p. l., pp. 148.

Contains four separate articles of which the first two only have special reference to Nevada. The first, "Report upon and list of birds collected by the expedition for explorations west of the one hundredth meridian in 1872;" pp. 5-33, refers more particularly to the birds of south western Utah and south eastern Nevada; the second, a "List of birds collected by Lieut. G. M. Wheeler's Expedition, 1871," pp. 34-36, consists of a list collected by that expedition between Bull Run Mountain, and Tucson, Arizona, the greatest number being taken in Nevada, and form the basis of the remarks in the present paper.

1874–75. **RIDGWAY, ROBERT.** List of Birds observed at Various Localities, contiguous to the Central Pacific Railroad, from Sacramento City, California, to Salt Lake Valley, Utah. <Bull. Essex Inst., vol. vi, No. 10, 1874, pp. 169–174; vol. vii, No. 1, 1875, pp. 10–24; vol. vii, No. 2, 1875, pp. 30–40.

1875. **HENSHAW, H. W.** Annual Report upon the Geographical Explorations and Surveys west of the one hundredth meridian, in California, Nevada, Nebraska, Utah, Arizona, Colorado, New Mexico, Wyoming and Montana, by George M. Wheeler, First Lieutenant, U. S. A.; being Appendix LL of the Annual Report of the Chief of Engineers for 1875. Washington: Government Printing Office. 1875. 8vo pamph., pp. i–iv, 1 l., pp. 1–196, maps, ill., etc. >App. I 2, pp. 153–166.

Consists of an annotated list of the birds of Arizona comprising two hundred and ninety-one species, based upon the author's observations and supplemented by those of other observers, prominent among which is Dr. Cooper, whose notes form the authority for the western portion of the territory and the Colorado Valley.

1875. **HENSHAW, H. W.**, Engineer Department, United States Army. Report upon Geographical and Geological Explorations and Surveys West of the One Hundredth Meridian, in charge of First Lieut. Geo. M. Wheeler, Corps of Engineers, U. S. Army, under the direction of Brig. Gen. A. A. Humphreys, Chief of Engineers, U. S. Army. Published by authority of Hon. Wm. W. Belknap, Secretary of War, in accordance with Acts of Congress of June 23, 1874, and February 15, 1875. In six volumes, accompanied by one Topographical and one Geological Atlas. Vol. V.—Zoology. Washington: Government Printing Office. 1875. 4to pp. 1021, pll. >Chap. III. Report upon The Ornithological Collections made in portions of Nevada, Utah, California, Colorado, New Mexico, and Arizona, during the years 1871, 1872, 1873, and 1874, by H. W. Henshaw. pp. 133–507, with xv col. pll.

The report is based upon the material gathered by the regular collectors of the expeditions which, in a few instances, was increased by other of the survey assistants. Much valuable matter is contained in the work in addition to the extensive synonymatic lists, the classification and nomenclature followed being that adopted by Baird, Brewer, and Ridgway for the Land Birds, and for the Water Birds, that given by Dr. Coues in his "Check List."

1875. **NELSON, E. W.** Notes on Birds observed in portions of Utah, Nevada, and California. <Proc. Boston Soc. Nat. Hist., vol. xvii, 1875, pp. 338–365.

Article III, pp. 349–352, notes 33 spp. found in the vicinity of Elko, Nev., bet. Aug. 6–14th; followed by a list of 17 spp. (pp. 352–355) found 25 miles north of Elko.

1875. **RIDGWAY, ROBERT.** First Impressions of the Bird-Fauna of California, and General Remarks on Western Ornithology. <Scientific Monthly, 1875, pp. 2–13.

1876. **HOFFMAN, W. J.** Habits of Western Birds. <Am. Nat. x, 1876, p. 238, 239.

Treats of *Icterus bullocki*, *Buteo swainsoni*, *Corvus americanus* (= *C. frugivorus*), and *C. corax* (= *C. corax carnivorus*).

1877. **HENSHAW, H. W.** Report on the ornithology of portions of Nevada and California. By Mr. H. W. Henshaw. <Ann. Rep. Geog. Surveys West of the 100th Meridian, etc., being Appendix NN of the Ann. Rep. of the Chief of Engineers for 1877, Washington, 1877, pp. 1303–1322.

I. Consists of general remarks on the distribution of certain species, with notes on breeding, migrations, etc., occupying pp. 1303–1307. II. "List of birds observed near Carson City, Nev., from Aug. 25 to Sept. 16, and from Nov. 10 to Nov. 20, 1876, with notes," enumerating ninety-six species, pp. 1307–1315. III. "List of birds observed on the eastern slope of the Sierras, near Carson City, Nev., from Sept. 16 to Nov. 7; with notes," enumerating sixty-nine species, pp. 1315–1322. In the present paper is noted for the first time the occurrence in Nevada of the Fulvous Tree Duck (*Dendrocycna fulva*), and the Varied Thrush (*Turdus nævius*).

1877. **Ridgway, Robert.** Professional Papers of the Engineer Department, U. S. Army, No. 18. Report of the Geological Exploration of the Fortieth Parallel, made by order of the Secretary of War according to Acts of Congress of March 2, 1867, and March 3, 1869, under the direction of Brig. and Bvt. Major General A. A. Humphreys, Chief of Engineers, by Clarence King, U. S. Geologist. Washington: Gov't. Printing Office, vol. iv, 1877. > Part III. Ornithology, pp. 305–643, and pp. 652–669.

Contains complete description of the birds obtained by the author while attached to the expedition, covering the area from San Francisco, Cal., to the eastward of Salt Lake City, Utah. The area covered by Mr. Ridgway forms a narrow tract of about seventy miles in width, entering Nevada from the parallel of 39° at the southwestern limit to that of 42° at the northeastern, including most of the northern portion of Nevada.

1878. **Coues, Elliott.** Department of the Interior | United States Geological Survey of the Territories | F. V. Hayden, U. S. Geologist-in-charge | — | Miscellaneous Publications—No. 11 | — | Birds of the Colorado Valley | A repository of | scientific and popular information | concerning | North American Ornithology | By Elliott Cones | *Ἦλθ', ἦλϑε χελιδὼν καλὰς ὥρας ἄγουσα* | — | Part First | *Passeres to Laniidæ* | *Bibliographical Appendix* | Seventy *Illustrations* | — | Washington | Government Printing Office | 1870 | 1 vol. 8vo. pp. i–xvi, 1–807.

In this work "the whole subject of the bibliography of North American ornithology, and of the synonymy of North American birds, has been worked up anew from the very bottom, as a matter of original personal investigation admitting of nothing at second hand. Not only the birds of the Colorado Valley, but also all others of North America, are thus exhaustively treated, their synonymy and bibliography being at length placed upon a satisfactory basis." (*From Prefatory Note by Dr. Hayden.*) The report consists of a systematic treatment of the families, genera and species, through *Passeres* to *Laniidæ*, represented in the region drained by the Colorado River and its tributaries, including portions of Arizona, New Mexico, Colorado, Utah, Nevada, and that part of California lying in the Valley of the Colorado proper. This comprises mainly that area between the Rocky Mountains on the east, and the Sierra Nevada on the west, known as the "Great Basin," corresponding with the "Middle Faunal Province" of some writers, as distinguished from the "Western" and "Eastern" Provinces respectively. The work may be regarded as complementary to the "Birds of the Northwest", *q. v.*

In connection with the author's own observations in the region treated, the labors of all the other naturalists in the same field are either referred to, or quotations submitted in the furtherance of the subject. This volume is one of the most important ever published upon the subject, and it is hoped that the entire remaining work may be completed at an early day.

1878. **Henshaw, H. W.** Preliminary Report on the Ornithology of portions of California and Nevada. By H. W. Henshaw, Field Season of 1877. < Annual Report Geograph. Surveys West of the 100th Meridian, etc., being Appendix NN of the Report of the Secretary of War, etc., Vol. II, Part iii, 1878, pp. 1607, 1608.

Notes the occurrence of *Turdus nævius* on the eastern slope of the Sierra Nevada, and the breeding of *Zonotrichia leucophrys*.

1880. **Ridgway, Robert.** A Catalogue of the Birds of North America. < Proc. U. S. Nat. Mus., iii. Aug. 24–Sept. 4, 1880, pp. 163–246.

This edition has not been published separately, although a number of extras were struck off for private use. The catalogue forms the basis of the following one, viz:

1881. **Ridgway, Robert.** Nomenclature of North American Birds chiefly contained in the United States National Museum. By Robert Ridgway. < Bull. Nat. Mus. No. 21, 1881, p. 94.

In this catalogue the nomenclature has been brought fully up to date, supplying the wants of ornithologists so long felt in consequence of the many changes since the publication of the last Smithsonian list in 1859, the numerous accessions to our fauna, etc., etc. In this work 226 valid species and races are enumerated, which have either been first described or added to the North American fauna since 1859, while on the other hand, "no less than 42 names of the old catalogue have been relegated to the ranks of synonymy, and 20 more removed as extra-

1881. **Ridgway, Robert**—Continued.

limital. Furthermore, of the remaining 698 names over 300 have been more or less emended, so that only 395 of the 760 names as given in the old catalogue are retained in the current nomenclature!"—*From Introduction.* In the addenda (p. 85), the following named species are given, which have been described as new to science, since the preceding 84 pp. of the list were printed. These include all accessions up to January 1, 1881.

Polioptila californica Brewster.—Black-tailed Gnatcatcher.

This was given in the 1st ed. of this catalogue as *P. melanura* Lawr., but Mr. Brewster has recently determined that *P. melanura* was based upon the fully adult male of *P. plumbea*, and is therefore a synonym of that species. The Californian bird being unnamed, Mr. Brewster proposes for it the name *californica*, as above. (Bull. Nutt. Orn. Club, Apr., 1881.)

Helminthophaga cincinnatiensis Langdon.—Cincinnati Warbler.

Cf. Jour. Cinc. Soc. Nat. Hist., July, 1880, pp. 119, 120, pl. iv; Bull. Nutt. Orn. Club, v, Oct., 1880, p. 208, pl. viii.

Melanerpes formicivorus bairdi Ridgw.—Californian Woodpecker.

"In *Hist. N. Am. Birds* (vol. ii, p. 561), the Californian and Mexican specimens of this species were separated as geographical races on account of certain well-marked differences, and the name *striatipectus* proposed for the latter. Since it appears, however, that Swainson's name *formicivorus* was based upon specimens from southern Mexico, *striatipectus* becomes a synonym. The Californian form being without a distinctive name (*melanopogon* Temm. equalling *formicivorus* Swains.), I take great pleasure in dedicating it to Professor Baird. *M. formicivorus bairdi* replaces the true *M. formicivorus* throughout western Mexico, down to Colima at least, the other race, *angustifrons* Baird, being peculiar to Lower California."

Eurinorhynchus pygmæus (Linn.) Pearson.—Spoon-billed Sandpiper.

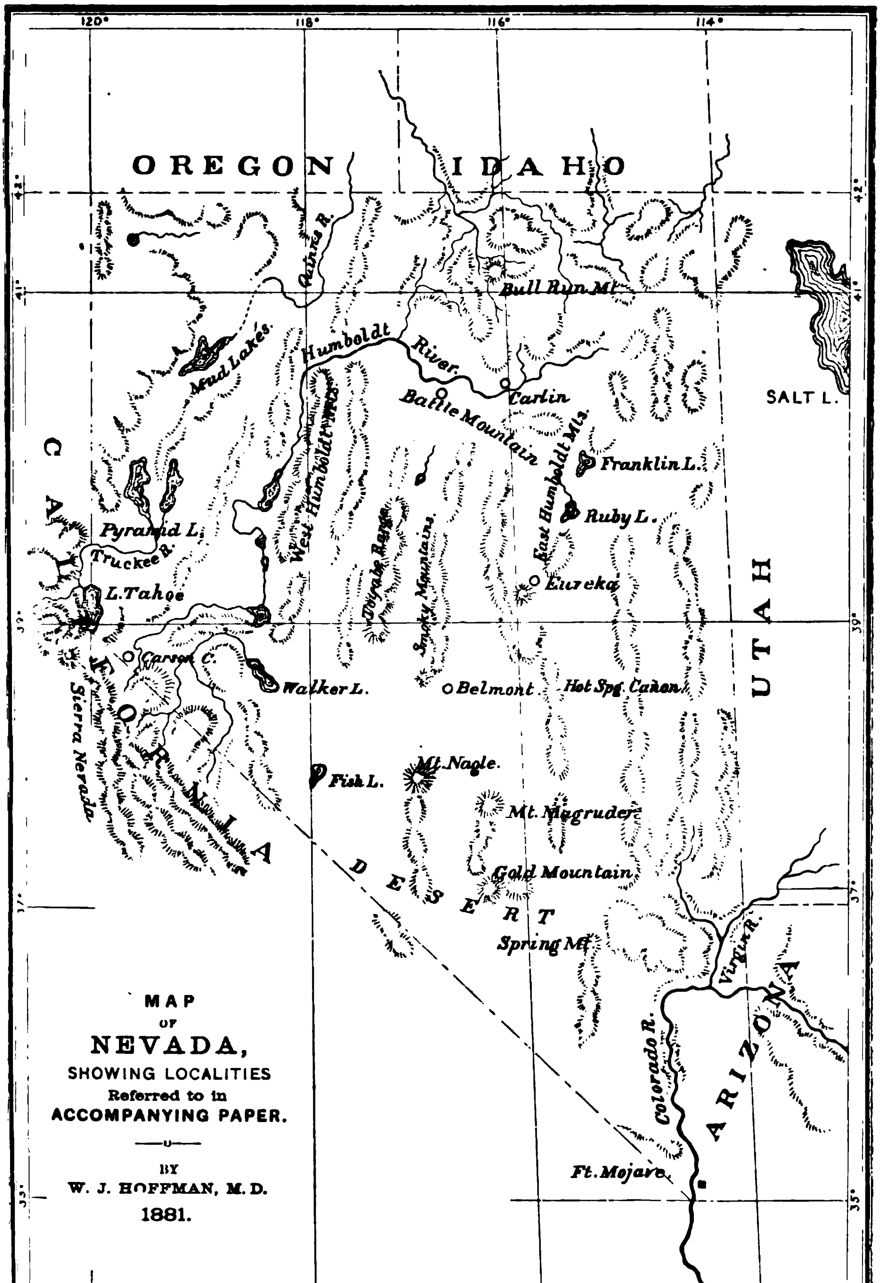
From Point Barrow, Arctic coast of Alaska.

Fulica atra Linn.—European Coot.

A specimen in the Copenhagen Museum obtained in Greenland in 1876. (Dr. J. Reinhardt, *in epist. fide* P. E. Freke.)

Fuligula rufina (Pall.) Steph.—Rufous-crested Duck.

Fulton Market, New York, Feb., 1872. Specimen in U. S. National Museum.



MAP
OF
NEVADA,
SHOWING LOCALITIES
Referred to in
ACCOMPANYING PAPER.

BY
W. J. HOFFMAN, M. D.
1881.

Art. X.—North American Moths, with a preliminary catalogue of the species of Hadena and Polia.

By Aug. R. Grote.

Trochilium (Sciapteron) simulans Grote.

♂. Antennæ rather short, stout, black, slightly bluish, brown at tips beneath. Head black with a yellow stripe on each side of the clypeus, bordering the eyes in front. Palpi ascending, concealing the front, yellow, with a fringing of black hairs at base. Vertex with a few yellow hairs between the antennæ. Collar yellow behind. Thorax black; a yellow spot at insertion of primaries and another beneath. A yellow stripe on each side at the tips of the patagia. A transverse yellow patch on the thorax behind. On each side of the metathorax are patches of yellow hairs. Abdomen golden yellow above, with the basal segment and part of the second ring black. The segments are very narrowly black anteriorly and there is a mesial row of black dots not very noticeable. Legs yellow; tarsi fulvous; middle and hind femora shaded with black; coxæ marked with yellow. Abdomen beneath with the segments half black and yellow; anal hairs yellow over black and tipped with fulvous. Fore wings stained with brown; costal edge blackish. A transparent space at internal angle. Hind wings pellucid. Fringes brown. Expanse, 36 mil.

This species is more wasp-like than any other North American species known to me. It is quite different from *Denudatum* or *Marginatum*. It may be known by the stout yellow abdomen and the absence of discal marks on the wings. In various papers I have described the following species of North American *Aegeriadae:*

Aegeria pictipes G. & R. Tr. Am. Ent. Soc. Phil. 2, pl. 2, fig. 64; Bailey, N. Am. Ent. 1, 17; Kellicott, Can. Ent. 13, 7.

N. B.—This species has the sexes much alike; the discal bar of fore wings is narrower and the head smaller than in the male *exitiosa*, which it much resembles.

Aegeria (*Pyrrhotaenia*) *floridensis* Grote, Can. Ent. 7, 14.

Aegeria lustrans Grote, Can. Ent. 12, 213 (*Trochilium*).

Zenodoxus maculipes G. & R. Tr. Am. Ent. Soc. 2.

Trochilium (*Sciapteron*) *simulans* Grote, B. B. E. S. 3, 78.

Eutheca mora n. g. et sp.

♀. I have several specimens of a Psychid (?) form which I cannot find in the books, and in collections the species is always unnamed. The antennæ are simple, scaled. Eyes naked; ocelli wanting. Maxillæ not perceivable. Labial palpi slight, hairy, ascending, curved. Body slender, sparsely haired. Legs rather stout and long; hind tibiæ with two pairs of spurs. Fore wings elongate; costa arched; external margin oblique, even; internal margin rounded at base, retiring before internal angle. Veins 12, simple, cell divided; veins 2, 3, 4, equidistant from the end of median vein. Vein 1 furcate at base. Cell incompletely closed. Veins 5 and 6 nearly equidistant between 4 and 7; 7 from extremity of the vein dividing the cell; 8, 9, 10 near together from upper corner of cell, running to costa before apex; 11 out of subcostal vein very near the base; 12 free. Hind wings 8-veined; veins simple; the cell incompletely closed; vein 2 out of median vein at within outer third; veins tending to be equidistant. The fore wings are ochrey brown, with costal dots noticeable before apices. A pale ochrey shade on internal margin at base, extending upwardly in a triangular manner beyond the middle. This shading is not always defined. A curved discal streak. Hind wings brownish fuscous. Fringes on both wings a little darker; even, concolorous. Beneath much as above; costal region of secondaries ochrey brown. The hairy body parts concolorous fuscous brown; with paler hairs about the head and face. Expanse, 30 mil. *Hab.*—New York. I have not seen the male. This form has a curious resemblance to *Hepialus*, but the antennæ are longer.

Heterocampa Chapmanii n. s.

♀. Several fresh specimens of a fine species of *Heterocampa* are contained in Mr. Thaxter's collection, found in Florida. The thorax and fore wings are pale gray green; the thorax behind is brown. The subbasal field is shaded with bright brown; the curved discal streak and the thick subterminal line are dark brown; the subterminal field is shaded with lighter brown. These brown or ferruginous shadings contrast. A fine brown line broken by the veins before the margin. The median lines are in triplicate, of a darker gray than the wing, waved. A broad white arcuate shade before the subterminal line, opposite the cell, extending to costa. Hind wings gray with a mesial line, the anal angle white. Beneath gray with a rusty subterminal straight shade line on fore wings. This fine species expands 52 mil., and is named for Dr. A. W. Chapman of Florida. It is readily distinguished from any of our species, and from the diagnoses must be different from those mentioned by Harris in his Correspondence edited by Mr. Scudder.

Platycerura furcilla Pack.

The larva, discovered by Mr. Thaxter, resembles that of *Charadra* or *Diphthera*, and is not at all like *Cerura*. The moth is related to *Audela acronyctoides* Walk., which I have referred to the *Noctuidae* and not to the *Bombycidae.*

Agrotis quarta n. s.

♀. Fore tibiæ unarmed. Rosy brown, resembling *baja.* Lines brown, badly marked; t. p. line broken into dots. Subterminal line subcontinuous, nearly straight. Orbicular round, nearly concolorous, with a bright stain edging the fine incomplete annulus within. Reniform reddish orange, contrasting, upright, with incomplete brown annulus, shaded with ochrey. A faint dotted terminal line. Hind wings fuscous with paler fringes. Beneath paler, shaded with rosy; with discal marks and exterior irregular common line. Collar brighter than the rosy brown head and thorax. Expanse, 40 mil. Sauzalito, Cal.

Agrotis Washingtoniensis n. s.

♂ ♀. I have considered this a form of *innotabilis* (Can. Ent. 12, 154), but a larger series of specimens collected by Mr. Morrison in Washington Territory shows no nearer approach to my type of *innotabilis* from California. In *Washingtoniensis* the median space is shaded with rich brown, the claviform is outlined, and several fine black lines cross the median space inferiorly. The orbicular is more oblique and is bright brown, not concolorous as in *innotabilis;* it is somewhat larger and squarer. The collar is bicolorous in both, and else the two species are much alike.

Agrotis immixta n. s.

♂. This species is paler than *inconcinna*, the ♂ antennæ more lengthily bristled, the fringes of the hind wings entirely pale. Pale grayish brown, the lines indistinct but strongly indicated by double black costal marks. The stigmata small, not dark ringed, paler than the wing, very inconspicuous. The s. t. line relatively well marked, broken. Hind wings whitish with the veins soiled, a faint terminal border and the fringes entirely pale; beneath with a dotted submarginal line. Fore wings beneath smoky with an even curved extra-mesial line. Discal marks indicated. Head and thorax pale brown; second joint of palpi blackish at the side. Tarsi dotted. Expanse 32 mil. Texas, May 12, Belfrage No. 518 (red label).

The exterior line on primaries is unusually removed outwards towards the s. t. line. This cannot be a form of *auxiliaris*, but it is not improbable that *inconcinna* is a form of that protean and widely distributed species.

Agrotis docilis n. s.

♀. Large-sized, resembling the type form of *auxiliaris*, or *perexcellens*, or *Wockei* in the markings. Lilac gray over blackish fuscous; the cell filled with black between and around the spots. Stigmata large, far apart, gray. Orbicular oblique, rounded above, straight below; claviform filled with black; reniform upright, excavate outwardly, narrow and long. Lines incompletely double, with pale included shades. T. p. line forming a series of irregular black lunules, more uneven and drawn in below median vein than in allied species. S. t. line consisting of a series of broken cuneiform spots marked by pale shades outwardly. Hind wings and fringes unicolorous pale fuscous. Beneath the hind wings a little paler but nearly unicolorous pale fuscous without marks. Thorax and head like fore wings; collar faintly lined; palpi and legs dark fuscous. Expanse, 48 mil. Colorado, Professor Snow.

Agrotis viralis n. s.

♂. Antennae ciliate beneath. Fore tibiæ unarmed, unless accidentally the spines are broken off, which sometimes occurs. Pale faded yellow fuscous; collar with a faint line. The lines obsolete. A blackish dash at base; another below it on internal margin; a dash across submedian space, and the cell before and between the stigmata darker shaded. Stigmata pale, concolorous, moderate. Orbicular outwardly oblique, near the reniform at base; both stigmata incompletely dark ringed. S. t. line indicated; s. t. space paler; terminal space darker. Hind wings paler, nearly concolorous with fore wings, darker shaded along outer border. Body concolorous; beneath without markings; hind wings quite pale. Expanse, 38 mil. *Hab.*—Nebraska.

Agrotis atrifera Grote, Bull. U. S. G. Surv. 4, 173.

Both sexes of this species have been taken by Mrs. French at Orono, Me. The Maine specimens only seem to differ from my California types by the orbicular being complete and the black discal shade a little more extended. The female has the hind wings a little darker.

Agrotis brunneigera Grote, B. B. S. N. S. 3, 80.

Specimens have been taken in Washington Territory by Mr. Morrison, and in Colorado by Mr. Neumoegen, which I cannot well separate from my Vancouver types (♀s) of this species in my collection. The stigmata are more obliterate and the color of a lighter fawn brown. The median lines are variably distinct, vividly contrasting, or, in one specimen, nearly obsolete. There is a black line on the collar as in *fuscigera*. The male antennæ are brush-like.

The *Noctuidae* from Washington Territory belong in many instances to the same species found in California, about San Francisco, and Vancouver Island. Among such species are the following:

Hadena divesta.
  curvata.
  indirecta.
Mamestra cuneata.
  cinnabarina.
Agrotis brunneigera.
  gravis.
Plusia labrosa.
Deva palligera.
Actinotia Stewarti.

Hadena separans n. s.

♂ ♀. Allied to *devastatrix*, but darker, shaded with blackish. The subterminal line forms a more decided M-mark, but not cutting the fringes; a black dash connects the small claviform with the exterior line; the internal margin has a black streak at base. The terminal space is shaded with blackish above and below its central constriction from the teeth of the s. t. line. Otherwise the two species are much alike in markings, and I hesitate to insist on other differences. It will be readily distinguished by the above characters. Expanse, ♂ 36, ♀ 40 mil. New York, in June, coll. A. R. Grote; Wisconsin.

Hadena violácea n. s.

I have hitherto regarded this western species as the same as our eastern *Bridghamii*, but it is evidently distinct. The ground color of primaries is reddish washed with lilac at base and over the subterminal space. The costal region is somewhat blackish. The stigmata are large, discolorous, pale clay yellow, and the terminal space is pale clay, interrupted with blackish at the middle and anal angle and leaving the apices pale clay. The thorax is pale clay and the head, also base of primaries; the abdomen is still paler and the hind wings white without bands. Beneath white, reflecting the markings of fore wings. Expanse, 35 mil. The type in my collection was collected by Mr. Behrens at Shasta, Soda Springs. A soiled specimen from Sierra Nevada is in collection Hy. Edwards. The wings are longer and narrower in *violacea*, as compared with our eastern *Bridghamii*.

Hadena characta Gr., Can. Ent. 12, 243.

Another female specimen in Mr. Tepper's collection from Nevada differs from the type in being more shaded with blackish, the claviform being suffused with black, and the black shading before the s. t. line being more evidently expressed. The reniform and orbicular are blackish centrally. The ochrey tinge behind the reniform always contrasts. The blackish fringes are neatly cut with white. The fuscous secondaries are indented on external margin opposite the cell. The species belongs to the series of *curvata*, *adnixa*, and *fumosa*. It is more gray, black and white, than the others, and looks a little like an *Agrotis* at first sight.

Hadena tracta Grote, Pr. A. N. S. P. 204, 1874.

This differs from *chalcedonia* by the thorax and fore wings at base being smooth pale fawn color or ochrey. But it is in other respects so like the Texan species which I determine as *chalcedonia*, that there can be no doubt it is a variety. The "common species from New York provisionally determined as *chalcedonia*," with which I provisionally compared it (l. c.), is not Hübner's species, and remains undetermined. It is the "*arna*" of some collections, but not, I believe, of Guenée. It bears a MS. name in my collection which I do not publish as the species is so common (Massachusetts to Texas) it must be named in the B. M. Lists, but what the name is cannot be made out from published data.

Hadena paginata Morr., P. A. N. S. Phil. 64, 1875.

I have examined Mr. Morrison's type through the kindness of Mr. Tepper. It is not in very good condition, the wings a little crumpled at the edges. It is a small glistening brown species looking like a

Caradrina, and not unlike Guenée's figure of *Monodes nucicolora*, pl. 4, fig. 9. It is probably the same as five specimens collected by Mr. Schwarz in Florida and which are before me. It differs from these only in the lines being dark and broader (whereas they are generally fine and pale with a dark edging in my fresher material), and in the secondaries (♂) being banded above. The primaries in *paginata* (type) are glistening brown. The reniform is small, near the t. p. line and almost touching it, preceded and followed by a blackish shade. The t. p. line runs out above the reniform obliquely, is angulate opposite to it, and below it is roundedly indented. The median lines approach on costa; the inner line runs *inwardly* obliquely and somewhat curvedly below the middle. With this, Mr. Schwarz's specimens generally agree, except that the lines are usually more pale, (when visible), the anterior line usually forms a more acute outer angulation on the cell and is less curved inferiorly. The wing is darker shaded outwardly, and the reniform touches inferiorly the t. p. line. It is barely possible that *paginata* represents a distinct species; but it is probable that it is a variety in which the darker margins of the lines are broader than usual. The material is not sufficient to finally decide the question.

Hadena fuscimacula n. s.

♂. Allied to *paginata* but more robust, different in color, in the shape of the stigmata and course of the lines and in the color of secondaries. Hind wings concolorous dark brown or fuscous; beneath both wings fuscous, with double exterior dark shade bands, brought into relief by paler accompanying shades. Fringes pale at base. Fore wings dusky brown, shaded with olivaceous. Lines continuous, dark, obsoletely geminate. Half line present. Inner line outwardly oblique, nearly even, approaching outer line on internal margin. Orbicular small, round, discolorous, dark fuscous. Reniform nearly upright, not lunate, somewhat figure-of-8-shaped, dark, discolorous. Outer line with a rounded exsertion opposite the reniform, even, followed more or less distinctly by black points. S. t. line pale, very indistinct, cutting the dusky brown terminal shading. Expanse 21 to 24 mil. Three fresh males, one in Mr. Tepper's collection, two in my own.

HADENA Schrank.

§ LUCERIA.

delicata *Gr.* Tr. Am. Ent. Soc. 92, 1874; *interna* Gr., Check List 1, 24. Can. Mass. N. Y.

Burgessi *Morr.* Bull. B. S. N. S. 2, 109. Mass.

†relicina *Morr.*, Pr. B. S. N. H. 216, 1875. Texas.

passer *Guen.*, Noct. 1, 195; *loculata* Morr., B. B. S. N. S. 2, 110. *var.* conspicua Morr. id. Mass. N. Y. Ill.

§Hadena *Tr.*

†Sommeri *Lefb.* Staud. Cat. No. 1398. Labrador.

exulis *Lefb.* Staud. Cat. No. 1406. Labrador.

ducta *Gr.* Bull. U. S. Geol. S. 4, 176. Maine. W. T.

devastatrix (or) *Brace*, Am. J. Sci. vol. 1; Harris Ins. Inj. Veg. 445; *abjecta* var. Guen. 194; *ordinaria* Walk. 232; Gr. B. B. S. N. S. 1, 108; Speyer Stett. Ent. Zeit. 147. Calif. East. W. and M. States. W. T.

separans *Grote* n. s. N. Y.; Wisc.

castanea *Gr.*, B. B. S. N. S. 2, 156; *var.* albina Gr. id. California. *cymosa* Gr. Papilio, vol. 1, 34. W. T.

occidens *Gr.*, B. U. S. G. S. 4, 177. Nevada.

arctica *Boisd.*, Gen. 120; *amica*‡ Harris 450; *Hadena amputatrix* Fitch N. Y. Rep. Calif.; Labr.; Eastern & Middle States; Can.

Bridghamii *G. & R.*, P. E. S. Phil. 6, Pl. 3, fig. 1. Eastern States.

violacea *Gr.* n. s. California.

exornata *Moeschl.* W. E. M. 4, 364, Taf. 9, 5. Labrador.

Hulstii *Gr.*; N. Am. Ent. 1, 93. Colorado.

dubitans *Walk.*, 232; Gr. B. B. S. N. S. 1, 108; Speyer Ent. Zeit. 446. European Alps; Vancouver; Eastern U. S.

N. B.—Considered a variety of the European *lateritia* by Dr. Speyer.

sputatrix (or) *Gr.*, B. B. S. N. S. 1, 190. Can. West. & Middle States.

suffusca *Morr.*, Proc. A. N. S. Phil. 61, 1875. Can.; Middle & East. States.

N. B.—There are two varieties of this species, one *suffusca*, the other according to Walker's det. his *Agrotis illata*, which latter name has priority.

apamiformis *Guen.* Noct. 1, 137; Gr. B. B. S. N. S. 1, 109. Eastern & Middle States.

vultuosa *Gr.*, Pr. A. N. S. Phil. 420, 1875. East. & Mid. States.

N. B.—Perhaps a form of the European *rurea.*

cristata *Harvey*, Bull. U. S. G. S. 4, 176. N. Y.

lignicolor (a) *Guen.*, 1, 140; Gr. B. B. S. N. S. 1, 109. *var.* quaesita Gr. Can. Ent. 9. Can.; West., Eastern & Middle States.

genialis *Gr.*, B. B. S. N. S. 2, 66. California.

auranticolor *Gr.*, Bul. B. S. N. S. 1, 109. Colorado. W. T.

cuculliiformis *Gr.*, Check List, 24. California.

verbascoides *Guen.*, Noct. 1, 141. Middle & Eastern States.

stipata *Morr.*, Pr. A. N. S. Phil. 64, 1875. Ill. Mass.

cariosa *Guen.*, Noct. 1, 144. Middle & Eastern States.

†sectilis *Guen.*, Noct. 1, 141. "Am. Sept." (?)

vulgaris *G. & R.*, Proc. E. S. Phil. 6, Pl. 3, fig. 2. Middle & East. States.

patina *Harvey*, B. B. S. N. S. 3, 7. Texas.

semilunata *Grote*, Pap. 1, 58. Wash. T.

inordinata *Morr.*, P. A. N. S. Phil. 63, 1875. Mass.

remissa *Hubn.*, 423. Eastern & Middle States.

N. B.—Considered by Guenée a form of the European *gemina*.

finitima *Guen.*, Noct. 1, 206; Speyer, St. Ent. Zeit., 150. Eastern & Middle States.

N. B.—Considered by Speyer a form of the European *basilinea*.

impulsa *Guen.*, Noct. 1, 194. Eastern & Middle States. *var.* mixta *Gr.* Texas.

N. B.—Guenée incorrectly describes this as a *Mamestra*, but there is a black *Mamestra* (assimilis) which must not be confounded with *impulsa*. A variety of *impulsa* has been collected by Belfrage in Texas; *var.* mixta *Gr.*, in which the pale powderings are more noticeable, the claviform rounded, all the lines narrower and more distinct, the reniform powdered with whitish, No. "628." In this the general color is lighter and there is no submedian shading from the claviform to the t. p. line.

leucoscelis *Gr.*, 6th P. Rep. 30. Wisconsin.

olorina *Gr.*, B. B. S. N. S. 3, 84. California.

Hillii *Gr.*, Ann. N. Y. L. N. H., 305, 1875. N. Y.

algens *Gr.*, Can. Ent. 10, 236. Maine.

vigilans *Gr.*, B. U. S. Geol. S. 4, 176. Maine.

senescens *Gr.*, Can. Ent. 10, 235. N. Y.

diversicolor *Morr.*, P. B. S. N. H., 132, 1874. Mass.

mactata *Guen.*, Noct. 1, 207. Eastern & Middle States.

turbulenta *Hubn.*, Zutr. fig. 67–68. N. Y.

indirecta *Gr.*, Can. Ent. 7, 28. Cal.; Vanc.; W. T.

divesta *Gr.*, Can. Ent. 7, 28. Cal.; Vanc.; W. T.

tusa *Gr.*, B. U. S. G. S. 4, 177. California.

tonsa *Gr.*, Can. Ent. 12, 214. Nevada.

chryselectra *Gr.*, Can. Ent. 12, 244. Colorado.

characta *Gr.*, Can. Ent. 12, 243. Nevada.

genitrix *Gr.*, Can. Ent. 10, 236. Nevada.

adnixa *Gr.*, Can. Ent. 12, 243. Nevada.

curvata *Gr.*, Bull. B. S. N. S. 2, 157. Cal.; W. T.

fumosa *Gr.*, B. U. S. G. S. 5, 205. Colorado.

longula *Gr.*, B. U. S. G. S. 5, 204. Colo.; Nev.; W. T.

tortilis *Gr.*, B. Brook. E. S. 3, 46. Wash. T.

marina *Gr.*, B. B. S. N. S. 2, 67. California.

miselioides *Guen.*, Noct. 2, 82; H.-S. Ex. 212. U. S. east of R. M.

chlorostigma *Harvey*, Can. Ent. 8, 53. Ill.; Texas.

† Dunbari *Harvey*, Can. Ent. 8, 52. Vancouver.

modica *Guen.*, Noct. 1, 207; *subcedens* Walk., 264. Eastern & Middle States.

vulgivaga *Morr.*, P. B. S. N. H. 144, 1874. Illinois.

fractilinea *Gr.*, Can. Ent. 6, 15. Can., N. Y.

modiola *Gr.*, B. U. S. G. S. 5, 204. Wisconsin.

confederata *Gr.*, B. B. S. N. S. 2, 143. Tex.; La.; coast of U. S. to N. Y.; Jamaica, W. I.

§

cylindrica *Gr.*, Can. Ent. 12, 214. Nevada.

§ PSEUDANARTA Hy. Edw.

flava *Gr.*, P. Ent. S. Phil. 1874; *var.* crocea Hy. Edw. B. Col.; Colorado.
singula *Gr.*, Can. Ent. 12, 215. Texas.
flavidens *Gr.*, B. U. S. Geol. S. 5, 205. Colorado.
aurea *Gr.*, B. U. S. Geol. S. 5, 205. Texas.

§ OLIGIA Hubn.

chalcedonia *Hubn.* 404. var. *tracta* Gr. P. A. N. S. P. 204, 1874. Texas.
versicolor *Gr.*, Pr. A. N. S. Phil., 204, 1874. Can.; N. Y.
†festivoides *Guen.*, Noct. 1, 220.
†arna *Guen.*, Noct. 1, 222.
exesa *Guen.*, Noct. 1, 222. Florida.
paginata *Morr.* P. A. N. S. Phil. 64, 1875. Florida.
fuscimacula *Grote* n. s. Florida.

REMARKS.—*Dryobota fibulata* Morr., B. B. S. N. S. 112, 1874, is not a *Dryobota.* I have seen the type, but could not examine it carefully; it seemed to me close to *leucoscelis*, if not the same. *Hadena rasilis* Morr. P. B. S. N. H. 158, 1874, I would refer to *Caradrina.* I have referred *Hadena minuscula* Morr. P. A. N. S. P. 431, 1875, to *Parastichtis. Hadena congermana* Morr. Can. Ent. 6, 106, has hairy eyes, and I have, I am sure correctly, referred it to *Mamestra;* it comes so close to *vindemialis*, that it has been suspected a form of that species, although there are not enough facts to support this view. *Hadena norma* Morr., Can. Ent. 7, 216, is the same as *Eustrotia mariae*, and I would refer it to *Eustrotia* (*Erastria* of Authors). The species commonly named *arna* in collections is not certainly that species from Guenée's description. I have identified *exesa* (from Guenée's description and an outline drawing of his) collected by Mr. Schwarz in Florida. It is possible that *Monodes nucicolora Guen.*, either belongs to this group or *Caradrina.* Specimens, collected by Mr. Schwarz in Florida, are in my collection, which seem to be *Hadena paginata* of Morrison, and can hardly be this species of Guenée's, whose description seems to cover a form allied to this and resembles in some points *Platysenta atriciliata.* It is perhaps impossible to identify Guenée's species without reference to the type, as there are several slender Noctuids in our fauna more or less corresponding with M. Guenée's description. The different species called "*sectilis*," and one of which is referred by Dr. Speyer (I know not on what authority) as "*sectilis* of Grote," can none of them, I think, be identical with Guenée's species, whose description I have not applied to any form. I have seen the species identified as *cariosa*, by me, called "sectilis," but other forms in collections occasionally receive this name. I am, myself, perhaps, responsible for part of this indecision, for some years ago I was not sure which of our species were described by Guenée under *Xylophasia cariosa* and *sectilis*, the description of the former being drawn up from a poor specimen. Allowing for this, Guenée's description covers our common species, while the phrase "La côte est entièrement claire," seems to me decisive, and to refer to the white shaded costa of the form which I call *cariosa*. As to the British Museum Lists, they contain descriptions of several species of North American Hadenoid forms under various genera, which cannot be at all made out from published data and they are accordingly omitted here. Finally, I believe the *Dryobota paviae* of Dr. Behr to be a later name for *Hadena curvata*. It is possible that a few of the forms included here may be separated under other genera. The above list contains Hadenoid forms agreeing in having naked eyes and unarmed tibiæ. The thoracic tufts are usually present. They appear to be very small and confined to the base of the thorax in *confederata*, which is an aberrant form, nearest, perhaps, to our *fractilinea*, leading to subtropical species having somewhat the aspect of *Prodenia*. The abdominal tufts are wanting in *Oligia*, and the frail species resemble *Caradrina*, which latter genus, by the way, does not seem to have strong characters. The abdomen remains conical in *Oligia*, however; it is flattened in *rasilis*, which on this and other accounts I would not keep under *Hadena*. The abdominal tufts are also very difficult to perceive in *devastatrix*, which latter, otherwise, is a typical *Hadena*. They are of very different development in the several forms. The group needs a careful study with the forms of the genitalia taken into account and a strict comparison made with the European forms. The present list, however, appears to me more exact than any I have yet published (and no other author has yet attempted to arrange our species), and gives an approximate basis on which to compare the representation of the genus in Europe and America. Staudinger gives 53 species in 1871, belonging to the European fauna. The present list gives 79 names.

POLIA Treitschke.

The following is a list of the North American species which I refer to the European genus *Polia*. Mr. Morrison's *confragosa* and *speciosa* are yet unknown to me. I have identified *perquiritata* of this author; it is not a *Polia*, but an *Agrotis*, allied to the European *A. speciosa* and possibly identical with it. Moeschler records *Agrotis speciosa* from Labrador. *Agrotis perquiritata* has been taken in Northern New York and at the camp of the Entomological Club on Mount Washington. For the present I keep *Pachypolia atricornis* as generically distinct. The antennæ of the male are strongly bipectinate; they are serrate in *acutissima* and *medialis*. A comparison with the European species is needed to establish the limits of the group, and for want of complete foreign material I have not been able to decide the question. I arrange the species provisionally in three groups; the first may come to be united with *Pachypolia.*

GROUP A.

acutissima *Grote*, Check List 23. Can.
medialis *Grote*, Ann. Lyc. N. H. N. Y., 306, 1876. Can.; N. Y.

GROUP B.

illepida *Grote*, Can. Ent. 11, 95. Colorado.

GROUP C.

aspera *Morr.*, Bost. S. N. H. 132, 1874; *diffusilis* Harv., Can. Ent. 10, 56. Northern N. Y.
pallifera *Grote*, Can. Ent. 9, 88. Illinois.
†speciosa *Morr.*, P. Bost. S. N. H. 137, 1874. Mass.
†confragosa *Morr.*, P. Bost. S. N. H. 138, 1874. Canada.
aedon *Grote*, Can. Ent. 12, 154. Nev., W. T.
theodori *Grote*, Can. Ent. 10, 237; id. 12, 219. Colorado.
epichysis *Grote*, Can. Ent. 12, 219. California.

Gortyna impecuniosa n. s.

A smaller and darker form, without clypeal tubercle, allied to *cataphracta.* Fore wings dark yellow with the outer margin washed with purplish leaving a terminal yellow shade and the apices with a yellow blotch. Median space shaded with rusty. Stigmata concolorous, simple, all present. Exterior line simple, less exserted than usual. Hind wings pale fuscous. The type, a male in my collection, expands 25 mil. I have seen other specimens, larger, in collections submitted to me for determination. Massachusetts.

Gortyna erepta n. s.

♂. A stout and rather aberrant form. Eyes naked; front unarmed; tibiæ unarmed; feeble dorsal tuftings on the abdomen. Yellow. Fore wings dull orange yellow with the lines fuscous, simple. The exterior well removed outwardly, a little waved between the veins. Half line present; interior line uneven, a little outwardly projected below median vein. Claviform a simple outline, incomplete. Orbicular concolorous, a small ringlet. Reniform small, a white half-moon in a blackish shade. Hind wings dull yellowish with faint discal mark and exterior line. Beneath dull yellowish with faint exterior common line and discal marks. The insect is nearly concolorous; fore wings and thorax darker. An even terminal line on primaries. Antennæ simple, ciliate beneath. Expanse, 34 mil. Douglas County, Kansas, Professor Snow.

Gortyna juvenilis Grote, n. s.

I described this species some time ago; the MS. is in Professor Snow's hands. It is a small form, allied to *sera*, with bright yellow fore wings, deeper shaded over median space and along terminal margin of fore wings. Stigmata concolorous. Lines oblique, uneven. Hind wings blackish. Thorax like fore wings. Eyes naked; tibiæ unarmed. Expanse, 29 mil. Taken by Professor Snow in Colorado.

Gortyna obliqua *Harvey.*

This species is the Californian representative of the Eastern *immanis* of Guenée. The outer pale line is more oblique than in our species. In color and markings the two are else much alike, but I have no doubt of the specific validity of the Western form. Our Eastern *stramentosa*, very different from *immanis* in color, resembles it in the shape of the exterior line and just where *obliqua* differs from both our Eastern species. Mr. Hy. Edwards, to whom I am indebted for my pair of *obliqua*, has a number of specimens of the Californian form quite constant in its characters.

Gortyna Harrisii n. s.

♂ ♀. This species is allied to *rutila* and between that species and *purpurifascia*. Fore wings varying from ferruginous orange to ochrey yellow, clouded and shaded with purply fuscous. Lines distinct. Exterior line double, the outer component line dark and thick; the line is a little projected below costa, thence inwardly obliquely and evenly to internal margin. Base of the wing yellowish; a dot, sometimes whitish on median vein. Orbicular and claviform white, rounded, the latter including a little spot superiorly. Reniform a yellow, angulated streak, surrounded by a cluster of dots partly yellow and partly white. Thorax purply or yellowish, dark; a tuft behind the collar; dorsum of abdomen tufted; front without tubercle. Hind wings with a mesial line and exterior shade; varying in pallor. Beneath more reddish, with discal mark and line distinct on hind wings. Expanse, 36 mil. Massachusetts, reared by Mr. Roland Thaxter.

This species is represented in the Harris collection by two specimens under the number 361. I have been in doubt which species was intended by Dr. Harris under the name *Leucostigma*; it may be either this or *Rutila*, but the question has no synonymical interest since there is a very different European species with the same name, not generically separable from *Gortyna* Hübn., of which *Micacea* is the type.

The excellent collection of Mr. Thaxter enables me to present a few notes on our species of *Gortyna*. Guenée's figure of *Rutila* does not give the details very distinctly, and in this genus the course of the transverse posterior line must be observed. In *Rutila* it is bent opposite the disc; this is indicated in Guenée's figure, where it margins *inwardly* the purplish subterminal space; in this same figure the subterminal line is prominent, straight, and but slightly uneven. In studying the figure this subterminal line must not be mistaken for the t. p. line, which is not distinctly given. In his description Guenée does not mention it.

I think *Marginidens* will prove to be founded on larger and darker specimens of *Rutila*, but of this I am not certain. *Harrisii* has the t. p. line thick, not bent opposite the cell, but with a slightly rounded costal projection, and double. In *Purpurifascia* the t. p. line is thick and straight, angulated just at the costa, the angulation sharper than in *Harrisii*, than which it is more orange and freer from fuscous shadings. It will be quite difficult to separate *Sauzalitae* and *Harrisii* from the markings, but the t. p. line is a little more drawn in below median vein in the Californian species, in which the clypeus is mucronate, while in *Harrisii* it is smooth. In *Sauzalitae* the projection is perpendicular and wedge-shaped; it can be felt with a fine pin, and under the glass readily perceived. In *Buffaloensis* the clypeus has a central conical projection, rising from all sides to a blunt point. On account of this bulging of the clypeus I have regarded *Sauzalitae* and *Buffaloensis* as congeneric with the European *Ochria Flavago.*

Mr. Thaxter has a fine series of *Quaesita* and *Rigida*. The former, with its evenly dark orange red color and the strong angulation of the median shade and outward rounding of the t. p. line, is very distinct; in some varieties the anterior stigmata are white. In its total appearance this species recalls *Nictitans* var. *Lucens*, while larger, and quite different in the details of its markings. *Rigida* is the palest species. Of a light straw yellow with purplish contrasting s. t. space and terminal shadings, the concolorous spots finely outlined, it vaguely recalls the European *Dicycla Oo*, without the red markings. It differs from *Cataphracta* again by the rigid t. p. line, and is perhaps usually a smaller insect. *Gortyna limpida* may be distinguished from *Cerussata* by its smaller size, darker color, and the shape of the reniform. In *Cerussata* the reniform is long and narrow, the central bent yellow line surrounded by small white spots as is usual, but the whole reniform is longer and narrower than in any of the allied species. Of the other allied species with white spots, *Serrata* from the West may be known by the pectinated male antennae. *Speciosissima*, the largest and finest of them all, an Eastern form from Rhode Island (Mrs. Bridgham) and Massachusetts (Mr. Thaxter), has very marked characters and needs no further comment. Including the section *Apamea*, which I have discussed in the pages of the Proceedings of the Academy of Natural Sciences of Philadelphia, p. 205, 1874, and the two forms I have referred, as above noted, to *Ochria*, we have twenty-three species in our fauna which may be considered as belonging to *Gortyna* Hübner. For a notice of the generic synonymy I refer the student to the Check List of *Noctuidae*, Part 2, p. 37.

Orthosia decipiens n. s.

♀. This form, although larger than any *ferrugineoides*, at first seems to be a variety of that protean species; it differs by the clear yellowish, unbanded secondaries, and in this approaches *ralla.* As to the latter, its smaller size and dotted subterminal line must always distinguish it readily. The new form has the primaries of a faded orange, all the lines faint, concolorous, so that the wing wants all fuscous shadings. The markings are like *ferrugineoides*, except that they are not laid down in fuscous. The stigmata are concolorous, the reniform upright with contrasting inferior stain. Hind wings light yellow, immaculate. Beneath pale yellow with obsolete exterior line. Expanse, 38 mil. Northern Indiana in June.

Orthosia inops n. s.

Bears about the same relation to *euroa* that *ferrugineoides* does to *ralla*. Smaller, brighter colored, the fuscous lines single. Slight bodied; thorax and fore wings shaded with dusky orange red. Lines much as in *euroa*, the subterminal line *continuous*, not dotted as in *euroa*. Hind wings whitish, with obsolete bands, tinged outwardly with reddish. Beneath with faint double fuscous lines and discal marks. Front and middle tibiæ and femora brown. Expanse, 26 mil. Kittery Point, Mr. Thaxter.

Lathosea n. g.

The head is broad, closely applied to the thorax. Ocelli. Palpi with the third joint rather long and slender. Vestiture shaggy and coarse. Tongue moderate. Eyes naked. Male antennæ provided with a series of lamellæ, or plates, beneath, ciliated. Genitalia long and slender. Thorax tufted behind. Wings entire. The species has the outline and appearance of *Aporophila Yosemitae*.

Lathosea pulla n. s.

♂. Gray; the veins on primaries black; the fore wings shaded with blackish. Ornamentation simple, consisting only of the two median lines, which are not very distinct. Inner line single, black, forming three very large teeth, one on the cell, one on submedian space, another below vein 1; a short tooth on costa. Outer line interrupted, uneven, forming a tooth on vein 1; obsolete between the veinlets superiorly; forming black and white dots on the veins; its course is straight after its costal extension, where it is black, continuous, distinctly lined with white outwardly. Fringes white, soiled with blackish outwardly. A terminal blackish shade band cut by white points at the extremity of the black veins, which latter show a fine white edging. Traces of the reniform spot. Hind wings blackish fuscous, subtransparent, the veins darker, the fringes white, incompletely lined; no bands. Beneath nearly concolorous; fore wings darker; the ground is fuscous, with a mixture of white scales; the veins are prominently darker on hind wings, which show a discal cloud. On fore wings the terminal darker edging, interrupted by white points, is repeated beneath. The hirsute body is blackish above on the abdomen; the thorax is mixed gray; beneath, with the feet, paler. The fore wings show a very fine submedian white basal streak, accompanied by a thinner black ray; they are shaded with white or gray irregularly over costal region and subterminally. The costa is straight, apices produced, external margin oblique, even, very slightly rounded. The neuration can be nearly made out, owing to the veins being darker than the wings. Length of primary, 18 mil. Oregon, Mr. Hy. Edwards. One male specimen.

This singular form differs from any Noctuid I have yet seen. I place it provisionally with *Arzama* and *Admetovis*.

Pseudoglaea decepta n. s.

♂. Eyes naked; front flat with the vestiture converging from the sides. Fore tibiæ unarmed. Middle and hind tibiæ spinose. Aspect of a *Glaea*, the abdomen a little flattened. Ornamentation simple, like *blanda* and *taedata*. Color deeper, squamation close. Pale leather brown, the terminal space paler, contrasting. Lines simple, black, the inner preceded, the outer followed by a pale shade line. Inner line outwardly oblique with a terminal outward inclination, undulate. Outer line even. Stigmata large, concolorous, pale-ringed. Subterminal line, subobsolete, with faint dots. A terminal waved hair-line, fringes concolorous. Secondaries blackish with brown fringes as on primaries. Beneath a common even blackish band over the paler, fawn-colored wings. Head and thorax like primaries. Terminal joint of palpi distinct, conical, paler than the rest. Expanse, 40 mil. Colorado. Differs from *taedata* from Texas, and *blanda* from Vancouver, which nearly agree, by the obsolete row of s. t. spots and color of hind wings.

Litoprosopus futilis G. & R., Tr. Am. E. S. 2, 202, fig. 73.

This species is not uncommon in a collection made on the Indian River in Florida. It closely resembles a specimen in my collection from Panama, which I believe to be *L. confligens* Walk., but differs decidedly, as follows: On the secondaries the black ocelloid spot on the paler marginal band shows chalybeous scales within and before it, between the mesial pale band and the marginal band, in *L. confligens*, but not in the Florida species. Again, the mesial pale band is angulated on vein 1, and again opposite the upper angle of the cell, and is more even in *futilis;* this character is more apparent beneath, where the two dusky bands are farther apart and the wing itself is darker in the Florida species. While the general color and the markings of the fore wings are quite similar, the differences above detailed are evident on examination; in *L. confligens* the mesial band beneath is rounded, and on the secondaries above more uneven than in *futilis*. Three species of this generic group are known: *futilis* from Florida, *confligens* from Panama and the West Coast, not as yet known to me from our territory, and *hatuey* described by Professor Poey from Cuba.

Omphalocera cariosa Led., Pyr. 339, Taf. 6, fig. 12.

This species has been discovered by Professor Riley in Missouri. The maxillary palpi are not wanting, but are small and concealed.

Lederer thought they might be wanting. The ocelli are present. The males have a tuft above the long basal joint of the antennæ; this is wanting in the females, a sex unknown to Lederer. *O. cariosa* is reddish brown, with a row of pale dots along external border, and the shortly dentate outer line is filled in by a similar row of dots, partly continuous, which in Lederer's figure (the colored copies) are represented by a pale band. The color and other markings agree closely, and the structural characters, which are sufficiently unusual, and I have no doubt that Lederer's North American specimens belong to the same species as Professor Riley's. I myself captured a female example in Alabama, which I thought a variety of Lederer's species, but am now satisfied belongs to a distinct form.

Omphalocera dentosa n. s.

♀. A little larger than *cariosa*, with quite a different color, being dusty olive brown, without any reddish brown tinges. The median space is dark blackish brown. The pattern of ornamentation is the same, but the outer line is composed of well-defined and rather broad, open teeth. The line is double, filled in by a pale shade, and is brought a little nearer the margin over the median nervules than in *cariosa*. The interspaces beyond the t. p. line show dentiform shadings of the lighter and darker colors of the wing. The fringes are dark. The terminal dots do not contrast as much as in *cariosa*. The veins are darker marked. *O. dentosa* has the under surface fuscous with a common external double line near the border, which seems a little less strongly dentate than in *cariosa*. The abdomen is furnished with brown tufts on the dorsum in both forms. In place of the discal mark (?) there is a pale dot on the subcostal vein and one below it on median vein, quite distinct in *cariosa*, hardly evident in *dentosa*, which expands 40 mil.

Botis capitalis n. s.

A large species, pearly white, with the thorax shaded with iridescent brown, and this dark color spreads over the fore wings at base and along internal margin. Reniform lunulate, very large, consisting of two thick curved brown lines, not united at top. A series of three brown marks on the interspaces of the median nervules just below and beyond the reniform. The orbicular is far from the reniform, a rather small brown ring, empty. The common exterior line is far from the cell and appears to take the place of the s. t. line; it is brown, irregular, lunate, distinct, outwardly rounded below median fold, not carried back as usual. The terminal line is marked by a broad shade at apices and so also on secondaries. There is a brown annulus on disc of secondaries and a brown line below it on internal margin which is here diffusely stained with brown. Abdomen stained with brown above, with a brown dorsal line and two white marks on the brown sub-basal segment. Beneath white; the reniform filled in on primaries, obsolete on secondaries. Palpi bicolorous, brown at tips; white at base. Legs white; fore legs marked with brown on the tibiæ. Expanse, 38 mil. Florida, in May; one specimen in my collection collected by Mr. Schwarz.

Botis fissalis n. s.

This form is allied to 5-*linealis* and more remotely to *gentilis* and *magistralis*. It has the same light brown color, a little paler than its ally. The lines are uneven, and the outer line more projected opposite the cell than in 5-*linealis*. The stigmata are open, not solid, and the reniform is composed of two parallel lines, not closed in at top and bottom. There is a submedian dash, as in *magistralis*. This species is not colored like *gentilis* or *pretextalis*, but like 5-*linealis* and *feudalis*, of a yellowish pale brown. Beneath it is paler than its allies, whitish opalescent. The disc about the stigmata is pale; also the s. t. space; the s. t. line evident. It is nearly as large as 5-*linealis*, expanding 30 mil. Two fresh females taken by myself near Buffalo, N. Y.

Botis augustalis n. s.

Allied to *signatalis* and the smaller roseate species, with a slightly greater expanse of wing. Fore wings with the external margin more oblique than usual; the primaries widen outwardly. Head and thorax above brown, and this color extends over the base of the rather dark vinous rosy fore wings, which show no markings except a rather large pale yellow spot marking the inception on the costa of the exterior line which is else lost or appears faintly as pale marks; fringes fuscous. Hind wings semi-transparent, entirely fuscous, darker outwardly with finely interlined and paler fringes. Beneath paler; the costal mark on fore wings repeated. Colorado.

Diphryx prolatella n. g. et sp. Crambidarum.

This form has been represented for some time in my collection by a single ♀ specimen which is somewhat stouter bodied than any *Crambus* known to me, and is excluded from that genus by the short labial palpi which hardly exceed the face. Ocelli. Clypeus mucronate. Eyes naked. Outline of wing that of *Crambus* (*vulgivagellus*), but the primaries are a little broader than usual, with acute apices and rounded external angle, the margin being nearly straight. The tongue is weak. In the specimen the maxillary palpi are certainly absent. Fore wings, head and thorax ochrey yellow, the thorax and inner half of primaries lighter. No markings except a double oblique series of golden irregular spots on the cell and on the interspace below median vein, the whole not prominent. The gilt scales are mixed with brown ones; and there are scattered gilt scale dots on the cell. Under the glass the surface is seen to be irrorate with brown scales. There is a neat series of terminal black dots before which a fine gilt dotted line, curving away from the margin at apex. All this is hardly visible to the unassisted eye. The fringes are gilt at base. Hind wings immaculate silky white with the fringes. Beneath pale, without markings. Expanse, 30 mil. Wisconsin, in September, collected by Mr. Westcott.

Prionopteryx olivella n. s.

♂. Antennae simple; ocelli small but present; hence this species differs from Professor Zeller's diagnosis of the genus. External margin of the primaries retiring below median fold where there is a projection of the fringe. Maxillary palpi bushy, triangulate; labial palpi much as in *Crambus*. Front mucronate. Olive fuscous with whitish or yellowish markings on the fore wings. A pale shade along submedian fold from the base outwardly. A pale mark at middle of costa and a larger blotch beyond it at apical third. An outwardly curved line on the costa beyond the blotch and seemingly the commencement of the subterminal line which it approaches on the median fold, but there terminates. The narrow pale s. t. line itself is bent outwardly above the median fold, running inwardly below it. The pale markings are relieved by darker fuscous shades. There is a fuscous blotch on internal margin at basal fourth and another at the middle which margins outwardly a very faint angulated pale line which seems to connect with the first costal mark. A narrow pale terminal line discontinued along the upper portion of the external margin. Fringes pale at base, fuscous outwardly. Hind wings pale fuscous, with whitish, finely interlined fringes. Beneath without markings; fore wings fuscous; hind wings soiled whitish. Head and thorax like primaries; palpi darker at the sides, light beneath. Expanse, 25 mil. *Hab.*—Carbondale, Ill., collected in June by Professor French.

In color this species is dull olive fuscous, there are no brown or cinnamon brown shades; the markings are narrow, of a soiled yellowish white relieved by blotches and margining shades of darker fuscous. My type is in nearly perfect condition, and fresh.

Fernaldia n. gen. (Tineidae).

This generic term is proposed for a stouter form than *Psecadia*, differing by the long, narrow, curved third palpal joint and in the neuration. Face thickly clothed with spreading hair. Maxillary palpi long, hanging. Eyes naked. Wings long; fore wings 12-veined; 4 to 8 out of the end of the cell, the upper outer corner of which is divided off by a longitudinal vein, the extension of vein 8 back to the main subcostal nerve midway between the origin of 10 and 11. Hind wings 8-veined; a cross-vein from veins 7 to 3; 5 and 6 nearly from one point at the angulation of the cross-vein; median vein 2-branched. Labial palpi not exceeding the front; third article longer than the thickly clothed second joint.

Fernaldia anatomella n. s.

Light brownish ocher, reticulated with dark brown. Primaries almost entirely covered with a large dorsal black brown patch, leaving the internal margin narrowly pale and the external margin more broadly pale brown over apical half. Lower edge of the patch uneven, running obliquely downwards and outwards from the base to basal third when it runs in again, letting the pale ground color obtain triangularly at before the middle. Costal edge pale brown, and there are three or four double dottings of pale scales at regular intervals. Hind wings fuscous, with a faint purply reflection, faintly dotted about apices. Beneath fuscous, the edges of the wings pale ochrey, dotted and marked. Head and thorax pale brownish ochrey; palpi with the second and third joints largely fuscous, tipped with pale ochrey. Legs fuscous, dotted with pale. Expanse, 34 mil. *Hab.*—New York.

This large species has been for sometime in my collection under the specific name here given to it. Professor Fernald has kindly assisted me in my endeavors to determine it, and I conclude that, while it is near *Psecadia*, it cannot be admitted into that genus, but forms a new generic type. The species is in other collections, and Professor Fernald has distributed my MS. name; from its large size and simple markings it can be easily identified.

Psecadia semiopaca n. s.

♂. White; the costal and larger half of primaries black. Third joint of palpi white, second joint almost wholly black. Head white; the clothing of the face is mixed with black scales. The antennæ are ciliate; the basal joint black with some white scales beneath and at base. Tarsi blackish, annulate with white. Tibiæ and femora of hind legs pale yellowish. Middle and fore tibiæ blackish flecked with white. Abdomen yellow, shaded with fuscous over the dorsum. Thorax white with a black spot on each shoulder, and two more behind, larger, one on each side of the dorsal line. Fore wings with the upper portion wholly black or blackish except the tips, which are white and show distinctly the black terminal dot of the interrupted series. Although the black portion of the fore wings fades a little to costa it everywhere vividly contrasts with the pure white ground color. The lower edge of the black portion of the wing is irregular. At basal third it runs upwards, leaving a black spot on the white field of the wing. It runs in again more deeply at outer third, and the black portion of the wing reaches the external margin narrowly below the apices, soiling the fringes. Fringes pure white. A terminal row of black dots. Costal edge whitish. Hind wings pale fuscous, becoming whitish translucent over internal region; fringes whitish. Expanse, 24 mil. *Hab.*—Colorado.

Differs from *arctostaphylella* by the larger black portion of the primaries which extends to outer margin flecking the fringes. The fringes of the hind wings are whitish interlined at base with fuscous, not yellow, and the secondaries themselves are paler.

Oedemasia eximia, n. s.

♂ ♀. This species is very much larger than *badia*, but similarly colored. All the markings indeterminate. Ground color a dusty faded ochrey with an olive tint. In some darker specimens there is blackish shading over the disc and beyond. Internal margin washed with purplish. A narrow purple brown basal streak, running downwards along submedian fold. The apices and a space along external margin before the angle pale. Lines lost; the outer line can be made out waved, below vein 3; on costa it appears outwardly oblique, even and double. A dark discal dot. Hind wings faded fuscous, with faint mesial line. Thorax faded olivaceous, stained with brownish on the edge of the tegulæ and the metathoracic hairs. There are sometimes one or two dark marks on subterminal field of primaries on the interspaces between submedian fold and vein 3. Male antennæ pectinate at basal two-thirds, tips simple. Female antennæ simple. Beneath without markings; the males show a paler exterior shade cutting the fuscous ground color. Costal preapical dots indicated. Expanse, 40 to 45 mil. New York; Massachusetts, collected by Mr. Roland Thaxter.

Gortyna Harrisii, Grote.

The larva of this species has been found in the stems of *Heracleum lanatum* by Mr. Thaxter.

I have commenced the manuscript of a second edition of my List of the Noctuidae of North America, published in 1874, and the following is an extract giving the first genera of the *Noctuae nonfasciatae* as far as *Apatela* (*Acronycta*). There are many species unknown to me except by name, and the hope that I shall find them and thus be able to present a more accurate list delays my completion of the work.

NOCTUAE Linn.

NONFASCIATAE Borkh.

DICOPINAE.

In this section are grouped genera with the head sunken, squamation rough or thick, male antennæ pectinate, legs unarmed except fore tibiæ, which have a stout claw, eyes naked, labial palpi short, ocelli present. The species appear usually early in the year; the chrysalis hibernates.

EUTOLYPE Grote.

Rolandi Grote, Proc. Acad. Nat. Sci. Phil. 198, 1874; *Copipanolis vernalis* Morr. P. B. S. N. H. 133, Dec. 1874. Eastern States to Texas.

DICOPIS Grote.

Muralis Grote 6th Ann. Rep. Peab. Acad. Sci. 27. Eastern States to Texas.
Thaxterianus Grote, Bull. B. S. N. S. 2, 196. Massachusetts; Tex.
Damalis Grote, Bull. U. S. Geol. Surv. 5, 208. California.
Depilis Grote, Papilio, 1, No. 4. Massachusetts; Ohio.

COPIPANOLIS Grote.

Cubilis Grote, 6th Ann. Rep. Peab. Acad. Sci. 30. Eastern States to Texas.

BOMBYCOIDEA.

AUDELA Walker.

Acronyctoides Walk., Can. Nat. Geol. 6, 37; Grote, Can. Ent. 9, 27; *Panthea leucomelana* Morr. Proc. Ac. N. S. Phil. 428, 1875; Grote, B. U. S. G. Surv. 4, 169. Canada; Western N. Y.; Maine.

PLATYCERURA Packard.

Furcilla Pack., Proc. Ent. Soc. Phil. 374, 1864. Larva on oak (Thaxter). Canada; Eastern and Middle States.

CHARADRA Walker.

Propinquilinea Grote, Trans. Am. Ent. Soc. 4, 293, Pl. 1, fig. 96; Goodell, Papilio, 1, 15. Eastern and Middle States; larva on the White Birch.

Deridens Guenée, Noct. 1, 35, Pl. 3, fig. 8; *Acronycta circulifera* Walk., 709; *Charadra contigua* Walk. Sup. 446; G. & R. Trans. Am. Ent. Soc. 2, 86. Canada to Southern States.

Dispulsa Morr. Proc. Bost. Soc. N. H. 213, 1875. Texas.

Palata Grote, Can. Ent. 12, 258. Colorado.

RAPHIA Hübner.

Abrupta Grote, Proc. Ent. Soc. Phil. 2, 336, Pl. 8, fig. 3, 1863. Eastern and Middle States.

Frater Grote, Proc. Ent. Soc. Phil. 2, 435, Pl. 9, fig. 7, 1864. Eastern and Middle States.

FERALIA Grote.

Jocosa Guenée, Noct. 1, 37; Grote, B. B. S. N. S. 2, 58. Eastern and Middle States.

MOMAPHANA Grote.

Comstocki Grote, B. B. S. N. S. 2, 59; Stett. Ent. Zeit. 195, 1875. New York.

DIPHTHERA Hübner.

Fallax H.-S. Exot. 80, fig. 211. Eastern, Middle, and Southern States.

Art. XI.—The Tertiary Lake-basin at Florissant, Colorado, between South and Hayden Parks.

By Samuel H. Scudder.

The following remarks are based upon collections and notes made during a visit to Florissant in the summer of 1877 in company with Messrs. Arthur Lakes, of Golden, Colo., and F. C. Bowditch, of Boston, Mass. As five days only were spent in the place, most of the time was given up to the collection and care of specimens, so that only a general survey of the locality was possible. Mr. Lakes especially gave himself to the study of the geology of the district, and as he was previously familiar with the structure of the surrounding country and placed his notes at my disposal, the first part of this paper should be considered our joint production.

GEOLOGY.

The tertiary lake-basin at Florissant, already famous for its prolific beds of plants and insects, is situated in a narrow valley high up in the mountains at the southern extremity of the Front Range of Colorado, at no great distance from Pike's Peak. The first, and so far as I am aware the only notice of it which has been published, is that by Mr. A. C. Peale in his account of the geology of Hayden Park and the country lying between it and the upper cañon of the South Platte.* · As it is brief, it is given here in full:

"The latter [Beaver Creek] flows to the northwest, and empties into the South Platte just below the upper cañon. About five miles from its mouth, around the settlement of Florissant, is an irregular basin filled with modern lake deposits. The entire basin is not more than five miles in diameter. The deposits extend up the branches of the creek, which all unite near Florissant. Between the branches are granite islands appearing above the beds, which themselves rest on the granite. Just below Florissant, on the north side of the road, are bluffs not over 50 feet in height, in which are good exposures of the various beds. The following section gives them from the top downward:

"1. Coarse conglomeritic sandstone.

"2. Fine-grained, soft, yellowish white sandstone, with bands that are more or less argillaceous, and containing fragments and stems of leaves.

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* Ann. Rep. U. S. Geol. Surv. Terr. 1873, p. 210. 8vo. Washington. 1874.

"3. Coarse gray and yellow sandstone.

"4. Chocolate-colored clay shales with fossil leaves. At the upper part these shales are black, and below pass into—

"5. Whitish clay shales.

"These last form the base of the hill. The beds are all horizontal. Scattered around are fragments of a trachyte, which probably caps the beds. In one of the valleys Mr. Taggart discovered, near an old well, pieces of trachyte, which, on looking at the excavation, was found to be the first layer penetrated. The point of overflow from which this material came is probably to the southward, in Dr. Endlich's district. The lake basin may possibly be one of a chain of lakes that extended southward. I had thought it possible that the beds were of Pliocene age. The specimens obtained from bed No. 4, of the section above, were submitted to Professor Lesquereux, who informs me that they are 'Upper Tertiary.' 'But I do not believe, as yet, that the specimens of the Green River group, to which your species are referable, authorize the conclusion of Pliocene age. I rather consider it, as yet, as Upper Miocene. The species known of our Upper Tertiary are as yet too few and represented in poor specimens for definitive conclusion. Your specimens have a *Myrica*, a *Cassia*, fragments of *Salix angusta* (A. Br.), a *Rhus*, an *Ulmus*, and a fragment of a *Poa* or *Poacites*.'

"The shales were so soft and friable that it was rather difficult to obtain any specimens.

"About one mile south of Florissant, at the base of a small hill of sandstone, capped with conglomerate, are 20 or 30 stumps of silicified wood. This locality has been called 'Petrified Stumps' by the people in the vicinity. The specimens of wood are not particularly good."

This basin is shown on sheet 13 of the geological atlas of Colorado published by Dr. Hayden's survey, and its outlines are marked with considerable accuracy, although upon a comparatively small scale. The data upon which that sheet was constructed have formed the basis of the accompanying map, in which the limits of the basin are given with closer accuracy and in greater detail. The point of greatest difference is in the valley of Fish Creek, where we noticed no extended prolongation of the lacustrine deposits; and as the contours of Dr. Hayden's parties themselves seem to forbid the probable extension of the deposits in this direction, we have closely limited them to what we saw.

The ancient lake lies in the valley of the present South Fork of Twin Creek, and of the upper half of the main stream of the same after the South Fork has joined it. Following the road from South Park to Colorado Springs, and leaving it just above Florissant Post-Office,* and then taking the track—half road, half trail—which leads over the divide toward Cañon City, we shall pass between the Platte River and the Arkansas divide, through the entire length of the basin. This road crosses the South Platte a short distance, say a kilometer and a half, below the mouth of Twin Creek, climbs a long, gradual slope on the east bank of the river to an open, grassy glade, about 2,500 meters above the sea, and then descends a little more than three kilometers from the river to join the valley of Twin Creek. We scarcely begin the descent before our attention is attracted by the outcropping of drab-colored shales which continue until almost the very summit of the divide is reached and the descent toward the Arkansas begun, a traveling distance of not far from thirteen kilometers.

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* Florissant is merely a post-office at Castello's Ranch, which is also provided with a store, the basis of supplies for all the inhabitants within a radius of fifteen kilometers. One would have to look far to find in Colorado a more comfortable hostelry than that to which "Judge" Castello will welcome us.

By climbing a neighboring peak, thrice baptized as Crystal Mountain, Topaz Butte, and Cheops Pyramid, we obtain an admirable bird's eye view of the ancient lake and the surrounding region. To the southeast is Pike's Peak; to the west, South Park and the cañon of the South Platte, shown by a depression; to the extreme south, the grand cañon of the Arkansas; while to the north a few sharp, ragged, granitic peaks surmount the low wooded hills and ravines characteristic of the nearer region. Among these hills and ravines, and only a little broader than the rest of the latter, lies, to the south, the ancient Florissant Lake basin, marked by an irregular L-shaped grassy meadow, the southern half broader, and more rolling than the northwestern, the latter more broken and with deeper inlets.

Recalling its ancient condition, and it will appear that this elevated lake must have been a beautiful, though shallow,* sheet of water. Topaz Butte, and a nameless lower elevation lying eight kilometers to its southwest, and which we may call Castello's Mountian, guarded the head of the lake upon one side and the other, rising three or four hundred meters above its level. It was hemmed in on all sides by nearer granitic hills, whose wooded slopes came to the water's edge; sometimes, especially on the northern and eastern sides, rising abruptly, at others gradually sloping, so that reeds and flags grew in the shallow waters by the shore. The waters of the lake penetrated in deep inlets between the hills, giving it a varied and tortuous outline; although only about sixteen and a half kilometers long and very narrow, its margin must have measured over seventy kilometers in extent. Still greater variety was gained by steep promontories, twenty meters or more in height, which projected abruptly into the lake from either side, nearly dividing it into a chain of three or four unequal and very irregular open ponds, running in a northwest-southeast direction, and a larger and less indented sheet, as large as the others combined, connected with the southwesternmost of the three by a narrow channel, and dotted with numerous long and narrow wooded islets just rising above the surface.

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* The shallowness of the lake is indicated by the character of the fish, the sun-cracking of some of the shales, and the erect sequoia stumps.

The ancient outlet of the whole system was probably at the southern extremity; at least the marks of the lake-deposits reach within a few meters of the ridge which now separates the waters of the Platte and Arkansas; and the nature of the basin itself, the much more rapid descent of the present surface on the southern side of this divide, with the absence of any lacustrine deposits upon its slopes, lead to this conclusion. At the last elevation of the Rocky Mountain chain, the drainage flow of this immediate region was reversed; the elevation coming from a southerly or southeasterly direction (perhaps from Pike's Peak), the lake, or series of lakes, was drained dry by emptying at the northwestern extremity. The drainage of the valley now flowed into a brook which followed the deeper part of its former floor, and the waters of the region have since emptied into the Platte and not the Arkansas, passing in their course between Topaz Butte and Castello's Mountain.

The promontories projecting into the lake on either side are formed of trachyte or other volcanic lavas, apparently occurring in fissures directly athwart the general course of the northwestern or upper series of lakes; and masses of the same occur at many different points along the ancient shore, such as the western corner where the waters of the lake were finally discharged; in the neighborhood of Castello's Ranch; along the eastern wall of the lowermost of the chain of upper lakes, near where the present road divides; and at points along both eastern and western walls of the lower southern lake. In general the trachytic flows seem to be confined to the edges of the lacustrine basin, but some, if not all, of the mesas or ancient islands of the southern lake have trachytic flows over them, and toward the southern extremity of the lake a larger island will be seen upon the map, now forming a rounded hill with steep northern walls, crowned by heavy beds of dark trachyte, and its slopes covered with quantities of vescicular scoriae. The rough and craggy knoll immediately overlooking Castello's Ranch, the reputed scene of Indian combats,* was witness of hotter times than those; vertical cylindrical holes, with smooth walls, in which a man could hide from sight, funnels scored by heat, mark, perhaps, the presence of former geysers; the basaltic rocks themselves are deeply fissured by the breaking up of the planes of division between the columns, affording the best protection to the Ute and Arapahoe warriors. But the very shales of the lake itself, in which the myriad plants and insects are entombed, are wholly composed of volcanic sand and ash; fifteen meters or more thick they lie, in alternating layers of coarser and finer material. About half of this, now lying beneath the general surface of the ground, consists of heavily bedded drab shales, with a conchoidal fracture, and totally destitute of fossils. The upper half has been eroded and carried away, leaving, however, the fragmentary remains of this great ash deposit clinging to the borders of the basin and surrounding the islands; a more convenient arrangement for the present explorer could not have been devised. That the source of the volcanic ashes must have been close at hand seems abundantly proved by the difference in the deposits at the extreme ends of the lake, as will be shown in the sections to be given. Not only does the thickness of the different beds differ at the two points, but it is difficult to bring them into anything beyond the most general concordance.

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* Their rude fortifications still crown the summit.

There are still other proofs of disturbance. Around one of the granitic islands in the southern lake basin the shales mentioned were capped by from one and a half to two and a half meters of sedimentary material, reaching nearly to the crown of the hill, the lowest bed of which, a little more than three decimeters thick, formed a regular horizontal stratum of small volcanic pebbles and sand (A and B of Dr. Wadsworth's note further on); while the part above is much coarser, resembling a breccia, and is very unevenly bedded, pitching at every possible angle, seamed, jointed, and weather-worn, curved and twisted, and inclosing pockets of fine laminated shales, also of volcanic ash, in which a few fossils are found (C of Dr. Wadsworth's note). These beds cap the series of regular and evenly stratified shales, and are perhaps synchronous with the disturbance which tilted and emptied the basin. The uppermost evenly bedded shales then formed the hard floor of the lake, and these contorted beds the softer but hardening and therefore more or less tenacious deposits on that floor.

The excavation of the filled-up basin we must presume to be due to the ordinary agencies of atmospheric erosion. The islands in the lower lake take now as then the form of the granitic nucleus; nearly all are long and narrow, but their trend is in every direction, both across and along the valley in which they rest. Great masses of the shales still adhere equally on every side to the rocks against which they were deposited, proving that time alone and no rude agency has degraded the ancient floor of the lake.

The shales in the southern basin dip to the north or northwest at an angle of about two degrees, and an examination of the map will show that the southern end of the ancient lake is now elevated nearly two hundred and fifty meters above the extreme northwestern point. The greater part of this present slope of the lake border will be found in the southern half, where it cannot fail to strike the observant eye upon the spot, the southernmost margin, close to the summit of the divide, being nearly two hundred meters higher than the margin next the school-house hill.

Our examination of the deposits of this lacustrine basin was principally made in a small hill, from which perhaps the largest number of fossils have been taken, lying just south of the house of Mr. Adam Hill, and upon his ranch. Like the other ancient islets of this upland lake, it now forms a mesa or flat-topped hill about ten or a dozen meters high, perhaps a hundred meters long and twenty-five broad. Around its eastern base are the famous petrified trees, huge, upright trunks, standing as they grew, which are reported to have been five or six meters high at the advent of the present residents of the region. Piecemeal they have been destroyed by vandal tourists, until now not one of them rises more than a meter above the surface of the ground, and many of them are entirely leveled; but their huge size is attested by the relics, the largest of which can be seen to have been three or four meters in diameter. These gigantic trees appear to be sequoias, as far as can be told from thin sections of the wood submitted to Dr. George L. Goodale. As is well known, remains of more than one species of sequoia have been found in the shales at their base.

At the opposite sloping end of the mesa a trench was dug from top to bottom to determine the character of the different layers, and the section exposed was carefully measured and studied. In the work of digging this trench we received the very ready and welcome assistance of our companion, Mr. Bowditch, and of Mr. Hill, the owner of the grounds.

From what information we could gain about the wells in this neighborhood it would appear that the present bed of the ancient Florissant lake is entirely similar in composition for at least ten meters below the surface, consisting of heavily bedded non-fossiliferous shales, having a conchoidal fracture. Mr. Peale does not say whether the well seen by Mr. Taggart passed below the trachyte which he says it first entered. Above these basal deposits, on the slope of the hill; we found the following series, from above downward, commencing with the evenly bedded strata:

Section in southern lake.

[By S. H. SCUDDER and A. LAKES.]

	Centimeters.
1. Finely laminated, evenly bedded, light-gray shale; plants and insects scarce and poorly preserved	3.2
2. Light-brown, soft and pliable, fine-grained sandstone; unfossiliferous	5
3. Coarser, ferruginous sandstone; unfossiliferous	3.8
4. Resembling No. 1; leaves and insect remains	21
5. Hard, compact, grayish-black shale, breaking with a conchoidal fracture, seamed in the middle with a narrow strip of drab shale; fragments of plants	23
6. Ferruginous shale; unfossiliferous	1.5
7. Resembling No. 5, but having no conchoidal fracture; stems of plants, insects, and a small bivalve mollusk	9
8. Very fine gray ochreous shale; non-fossiliferous	0.5
9. Drab shales, interlaminated with finely-divided paper shales of a light-gray color; stems of plants, reeds, and insects	46
10. Crumbling ochreous shale; leaves abundant, insects rare	7.5
11. Drab shales; no fossils	7.5
12. Coarse, ferruginous sandstone; no fossils	3.8
13. Very hard drab shales, having a conchoidal fracture and filled with nodules; unfossiliferous	63
14. Finely laminated yellowish or drab shales; leaves and fragments of plants, with a few insects	30
15. Alternating layers of darker and lighter gray and brown ferruginous sandstone; no fossils	10

	Centimeters.
16. Drab shales; leaves, seeds, and other parts of plants, and insects, all in abundance	61
17. Ferruginous, porous, sandy shale; no fossils	5.7
18. Dark-gray and yellow shales; leaves and other parts of plants	9
19. Interstratified shales, resembling 17 and 18; leaves and other parts of plants, with insects	17.8
20. Thickly bedded chocolate-colored shales; no fossils	41
21. Porous yellow shale, interstratified with seams of very thin drab-colored shales; plants	7.5
22. Heavily bedded chocolate-colored shales; no fossils	30
23. Thinly bedded drab shales; perfect leaves, with perfect and imperfect fragments of plants, and a few broken insects	20
24. Thinly bedded light-drab shales, weathering very light; without fossils; passing into	20
25. Thick bedded drab shales, breaking with a conchoidal fracture; also destitute of fossils	18
26. Coarse arenaceous shale; unfossiliferous	9
27. Gray sandstone, containing decomposing fragments of some white mineral, perhaps calcite; no fossils	178
28. Coarse, ferruginous, friable sandstone, with concretions of a softer material; fragments of stems	60 (?)
29. Thinly bedded drab shales, having a conchoidal fracture; somewhat lignitic, with fragments of roots, &c	25
30. Dark-chocolate shales, containing yellowish concretions; filled with stems and roots of plants	25
Total thickness of evenly-bedded shales (D of Dr. Wadsworth's note) above floor deposits (meters)	6.668

The bed which has been most worked for insects and leaves, and in which they are unquestionably the most abundant and best preserved, is the thick bed, No. 16, lying half-way up the hill, and composed of rapidly alternating beds of variously-colored drab shales. Below this insects were plentiful only in No. 19, and above it in Nos. 7 and 9; in other beds they occurred only rarely or in fragments. Plants were always abundant where insects were found, but also occurred in many strata where insects were either not discovered, such as beds 18 and 21 in the lower half and bed 6 in the upper half; or were rare, as in beds 10 and 14 above the middle and bed 23 below; the coarser lignites occurred only near the base.

The thickest unfossiliferous beds, Nos. 20 and 27, were almost uniform in character throughout, and did not readily split into laminae, indicating an enormous shower of ashes or a mudflow at the time of their deposition; their character was similar to that of the floor-beds of the basin.

These beds of shale vary in color from yellow to dark brown. Above them all lay, as already stated, from fifteen to twenty-five decimeters of coarser, more granulated sediments, all but the lower bed broken up and greatly contorted. These reached almost to the summit of the mesa, which was strewn with granitic gravel and a few pebbles of lava.

Specimens of these upper irregular beds, and also of the underlying shales, were submitted to Dr. M. E. Wadsworth, of Cambridge, who caused thin sections to be made from them, and has furnished the following account of their microscopical structure:

TUFA FROM FLORISSANT.

The method and scheme of classification employed here is that briefly sketched in the Bulletin of the Museum of Comparative Zoölogy (vol. v, pp. 275–287). By this system only do we think that the inclosed fragments could be named, for they contain so few crystals that in most cases the base is the principal thing upon which the decision must rest.

A.—THE FINER DEPOSIT JUST ABOVE THE SHALES.

A medium-grained gray tufa, containing crystals and fragments of feldspar, augite, &c., cemented by a fine earthy groundmass.

In the thin section it is seen to be an epitome of the volcanic rocks of the Cordilleras. The groundmass holds fragments of basalt, andesite, trachyte, and rhyolite, with detached minerals derived from them.

The basaltic fragments have in part a dense globulitic base porphyritically holding ledge-formed plagioclase crystals and a few augite granules. Some of the basalt is quite coarsely crystallized, approaching the doleritic type. Olivine was observed in some of the fragments, but it is largely altered to a reddish-brown serpentine. Magnetite is abundant. In many of the fragments the groundmass has decomposed to a reddish-brown mass, which is untransparent and holds clear crystals of plagioclase. The basaltic fragments have suffered more from alteration and decomposition than any others in the tufa.

Of andesite, both varieties pointed out by us (l. c., p. 280) occur in this tufa. The first, which is nearest the basalt in composition, has a brown glass as its base, filled with microlites. This base holds minute rectangular and oblong crystals of feldspar. Large microlites of augite and grains of magnetite were seen. Fragments of this are common, and are clear and unaltered. The second variety of andesite was seen to have a dense gray micro-felsitic base, holding ledge-formed feldspars and magnetite grains. Some contained the reddish brown fibers of the destroyed hornblende. Fragments of this variety of andesite are quite abundant.

The trachyte has a light gray, felty, and glassy base, some fragments showing besides this only faint traces of polarization caused by incipient feldspars. Other fragments show minute, well-formed crystals that appear to be sanidin. Grains of magnetite occur scattered through the base. This is also quite abundant, and it, as well as the basalt and andesite, surpasses the rhyolite in amount.

The rhyolite occurs in the form of a more or less clear glass, often cellular. The cells are often drawn out in the direction of the original flow, forming a fibrous structure, which when of a grayish or reddish brown color resembles woody fiber. Some of the fragments contain elliptical cells, and a few shards of water-clear glass free from inclusions were seen.

Many crystals entire or broken are scattered throughout the groundmass of the tufa. These crystals belong to plagioclase, sanidin, olivine, magnetite, augite, and quartz. But little quartz was observed; one crystal contained trichites and vapor cavities. The trichites are the same as those commonly seen in the quartz of granite, but this appears to have been derived from the lava. The feldspar contains inclusions of base, glass, and microlites, and through these the rock from which the feldspar was derived can often be told. The augites have the characters of andesitic augite. A little palagonite and one crystal of microcline were seen.

The groundmass of the tufa is composed of comminuted and decomposed material derived from the lavas before described. In the groundmass trachytic and rhyolitic material appears to predominate. This specimen was chosen for description, as it best represented the general characters of the tufas.

B.—THE COARSER DEPOSIT JUST ABOVE THE SHALES.

This is more coarsely fragmental than any of the others, and is composed of a yellowish brown earthy groundmass, holding fragments of quartz, feldspar, basalt, &c. Some of the fragments appear to belong to the older rocks, but none of them were seen in the section. Under the microscope the tufa is similar to the first one described, but its fragments are larger and sometimes better marked. Some kaolinized feldspars and a little biotite were seen. The hornblende in the andesite is in the usual broken forms, with blackened edges.

C.—A SPECIMEN FROM FINER PORTION OF THE UPPER CONTORTED BEDS.

A yellowish earthy groundmass holding crystals and fragments of augite and feldspar. On one side is a layer of fine detritus composed of the same material as the groundmass of the more coarsely fragmental portion. Its microscopic characters are similar to those of A, except that its materials are more decomposed and sanidin is more abundant. One kaolinized feldspar was observed.

D.—THREE SPECIMENS OF THE INSECT-SHALES.

These are brownish and grayish brown shales, being simply the finer material of the tufas laid down in laminae of varying thickness and coarseness. One is very thinly bedded.

This volcanic material has evidently been worked over by water, but the conditions can of course best be told in the field. So far, however, as we can judge by microscopic examination, when the water commenced its work the material was in loose unconsolidated deposits. That it was thrown out as an ash, or rather deposited as a *moya* near its present location, is the most probable supposition. It seems then to have been taken up by the waves and spread out as it is now found. The reason for this opinion is that the fragments are not worn as they would naturally be if they had been derived directly from solid rock by water action, and the decomposition is not so great as we should expect. The deposition appears to have been gentle but comparatively rapid, for there is no sign of violence or even of such decomposition as we should expect in slow deposition; and showers of ashes falling on still water or a lake acting on an unconsolidated tufa bank answer best the conditions called for here. It is probable from the kaolinized feldspars and the macroscopic fragments of apparently older rocks that the latter are present in the tufa to some extent. This can best be explained by the supposition that it was deposited as a *moya* or mudflow within reach of the waters that have worked it over and deposited it in its present position. As we said before, the field evidence must be relied upon mainly in deciding such questions as these.

M. E. WADSWORTH.

CAMBRIDGE, MASS., *April* 15, 1880.

Another section, less carefully measured and noted with less detail than the other, was taken at or near the same place as Dr. Peale's, mentioned at the beginning of this article, viz, at the extremity of one of the promontories jutting in a southwesterly direction into the middle of the upper chain of lakes, just west of the school-house* and about three kilometers west of Castello's Ranch. The top of the hill was covered with granitic gravel and loose bowlders of dark scoriaceous trachyte; below this we found, passing, as before, from above downward, the following succession:

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*Not the school-house before mentioned, which lies to the south of Castello's Ranch.

Section in the northwestern lake.

[By S. H. Scudder and A. Lakes.]

		Decimeters (estimated).
1.	Finely laminated yellow-drab shales; no fossils	12
2.	Coarse decomposing yellowish shales; no fossils	12
3.	Fine compact drab shales; perfect remains of plants and insects. Passing into	15
4.	Arenaceous shales; very lignitic	6
5.	Heavily bedded, coarse-grained, crumbling sandstone, of a grayish yellow and whitish color, becoming ferruginous in places; partially lignitic	60
6.	Chocolate and drab colored shales having a conchoidal fracture, passing below into whitish paper-like shales inclosed between coarse arenaceous laminae; plants and insects	45
	Total thickness of shales above floor deposits........(Meters, estimated)	15

These measurements being estimated are undoubtedly too great. The composition of this bluff is coarser in character than that of the section in the southern extension of the lake. The lignitic beds, which have been used for quarrying purposes, contain numerous fragments of reeds and roots not well preserved. The lower portions of the section correspond better with the other than do the upper beds, where it is difficult to trace any correspondence; No. 3 of the northwestern seems, however, to correspond to No. 16 of the southern series. The whitish paper shales lying at the base of this appear to be entirely absent from the southern section, and the distorted beds which crown the mesa are not apparent in the bluff, or, if present, are wholly regular. A more careful and detailed section of the bluff (for which we had not time), and particularly the tracing of the beds along the wall of the lake, would probably bring to light better correspondences. Directly in front of Judge Castello's house, at a level of a little more than 2,400 meters, is a bed of fossil fish.

Judging from the present physical condition of the basin, its age is marked as later than the movements which closed the cretaceous epoch and earlier than the last upheaval in the tertiary, which seems to have taken place during or after miocene times, but there are no physical data yet at hand to warrant definite conclusions on this head.

PALEONTOLOGY.

The insects preserved in the Florissant basin are wonderfully numerous, this single locality having yielded in a single summer more than double the number of specimens which the famous localities at Oeningen, in Bavaria, furnished Heer in thirty years. Having visited both places I can testify to the greater prolificness of the Florissant beds. As a rule, the Oeningen specimens are better preserved, but in the same amount of shale we still find at Florissant a much larger number of satisfactory specimens than at Oeningen, and the quarries are fifty times as extensive and far more easily worked.

The examination of the immense series of specimens found at Florissant* has not gone far enough to yield data sufficiently definite for generalization of any value, or which might not be altered or even reversed on further study. It may, nevertheless, be interesting to give a running notice of what has been observed in assorting the collection, and to make the single comparison with the Oeningen insect fauna which the number of individuals will furnish. This is indicated by the following table, based on a rough count of the Florissant specimens, but which cannot be far astray:

Percentage of representation by—	At Florissant.	At Oeningen.
Hymenoptera	40	14
Diptera	30	7
Coleoptera	13	48
Hemiptera	11	12
Neuroptera	5	17
Orthoptera	¼	3
Arachnida	¼	½
Myriapoda	1/25	
Lepidoptera	1/25	1/10
	99.58	101.6

It will be seen that the proportion of specimens of each order is very different in all that are well represented, with the sole exception of the Hemiptera, while the same groups (Orthoptera, Arachnida, Myriapoda, and Lepidoptera) are feebly represented in both. The greatest difference occurs in the Diptera, which are less than 7 per cent. of the whole at Oeningen and about 30 per cent. at Florissant; in the Hymenoptera, which have less than 14 per cent. at Oeningen and 40 per cent. at Florissant, due largely to the prodigious number of ants; while the case is reversed in the Coleoptera, which form nearly one-half the specimens found at Oeningen and only 13 per cent. at Florissant. We possess no count of the specimens found at Radoboj, in Croatia, which is regrettable, since the fauna of Florissant appears to agree much better with it than with any other, at least if one may judge from the comparatively minor part played by the Coleoptera and the great number of ants; these latter number 57 species in Radoboj, and one of them has furnished 500 specimens. Still the comparison cannot be carried very closely into other departments; for instance, only one rhynchophorous Coleopteron has been reported from Radoboj, while they are very numerous and rich in species at Florissant, and local causes must have had much to do with the fauna of each of these localities. It is hardly worth while to institute any inquiries into the proportion of the groups represented at Florissant and in amber, since the nature of the entombment is entirely different.

Let us pass, then, to a rapid sketch of the Florissant insect fauna, from which as yet only 16 species have been published; these will be enumerated in their proper place.

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* Among these are included about 1,000 specimens submitted by the Princeton expedition.

In Hymenoptera none have yet been described. About a dozen specimens are referred to Apidae and Andrenidae; several species are represented, but most of them are badly preserved; the largest appears to be a Bombus. Of Vespidae and other large wasp-like Hymenoptera about 70 or 80 specimens have been found, referable to about 30 species, one of which is a large Scolia or allied genus; several are Sphegidae, including an Ammophila; one, which seems to be a Polistes, shows traces of a blue-green metallic tint; another, apparently one of the Pompilidae, represents a species with a large subapical fuliginous spot on the wing; another, perhaps of the same family, has a circular clear spot in the center of the wing, surrounded with fuliginous. The ants are the most numerous of all insects at Florissant, comprising perhaps a fourth of all the insects; they form more than three-fourths, perhaps four-fifths, of all the Hymenoptera; I have already about 4,000 specimens of perhaps 50 species (very likely many more); they are mostly Formicidae, but there are not a few Myrmicidae and some Poneridae. I have noticed no Mutillidae. Ichneumonidae are very numerous; of minuter forms, having an expanse of wing of less than a centimeter, there are nearly 200 specimens, unusually well preserved; judging from a cursory examination they are exceedingly numerous in species, perhaps 80 all told, and many genera are represented; the larger forms, whose wings expand more than a centimeter, are even more numerous, both in species and individuals, and most of them are very fine, including a great variety, among which are especially noticeable a good assortment of species of Pimpla and allied genera. I have looked in vain for Pelecinus, or any long-tailed Rhyssae or Thalessae. The Braconidae, Chalcididae, Cynipidae, and Chrysidae, exceeedingly few fossil species of which have ever been described, are very abundant, but have not been fairly separated from each other and from other small species; together they number nearly 250 specimens and probably 50 species. Among others there is a Chrysis, showing metallic green reflections on the abdomen; and also more than half a dozen species of Chalcididae, with expanded femora, represented by over 20 specimens. Finally, there are about 60 Tenthredinidae of 14 or 15 species, and several genera; besides a single species of Uroceridae.

A few Lepidoptera occur. One butterfly in a most admirable condition has already been described under the name of *Prodryas Persephone*, and there are two more diurnal species, each represented by a single specimen and each also generically distinct from any living forms, but yet falling in the immediate vicinity of those most nearly allied to Prodryas, namely, among the highest Praefecti. Besides these there are a couple of poorly-preserved butterflies of uncertain position, and I have also set aside about a dozen specimens of perhaps 8 species of nocturnal Lepidoptera; but they are obscure, mostly of small size, perhaps Pyralidae or Tortricidae, and have not been critically studied.

Nearly a third of all the specimens I have seen from Florissant belong to the Diptera. Culicidae and Chironomidae are abundant, but not generally very perfect. Tipulidae are abundant and admirably preserved; of the larger forms alone there appear to be several hundred specimens, and apparently a considerable number of species. The smaller Tipulidae, including the Limnobina, are also abundant and well preserved. Some beautiful Mycetophilidae have been noticed, but these have not yet been selected from the mass of smaller flies. Bibionidae are the prevailing type among the Diptera; there must be 1,000 specimens belonging to this family, and on a cursory view there appears to be no great variety; probably both here and in the ants, as in some genera of plants, it will appear that there are vast numbers of a single species; a great many specimens are represented by bodies only, or these accompanied by insignificant fragments of wings; but even putting all these aside, there remain a goodly number with tolerably perfect wings, and some in which almost every part of the body is preserved; taken as a whole, however, they are perhaps less perfect than specimens of almost any other family. There are a dozen or more Stratiomyidae, of two or three species; and several species of Midasidae or Hermoneuridae, one admirable specimen of the latter family having been described as belonging to a new genus under the name of *Palembolus florigerus.* There are nearly half a hundred Asilidae and Therevidae, many of them exquisitely preserved, some of great size, and among them a fair variety of forms. Bombylidae are somewhat less abundant, but show some superb specimens of great size and in wonderful preservation; there are certainly six or eight species. Syrphidae are more abundant than the last, nearly 50 specimens having been found, in which the patterns of the abdominal colors are generally well marked, and among which we find a considerable variety. There is a vast host of Muscidae and allied groups, of which no account has yet been taken, and with which no doubt many other forms are still commingled; but three or four species of very pretty Ortalidae may be mentioned, with ten or a dozen specimens.

About three-fifths of the Coleoptera belong to the normal series and two-fifths to the Rhyncophorous division. There are 80 to 90 specimens of Carabidae, including perhaps 30 species; many of them are very fine and perfect, especially in the sculpturing of the elytra. Water-beetles are not so numerous as would be anticipated; there are not more than 60 or 70 specimens, with perhaps twenty species; there are no large Dytisci, such as occur abundantly at Oeningen; the largest of our species, perhaps an Hydrophilus, not exceeding 12^{mm} in length. The Staphylin dae are rather more numerous than the ground-beetles, with nearly 30 species, some of them tolerably large. There are half a dozen species of Nitidulidae. Some 60 or more Scarabeidae show considerable variety, there being nearly 30 species among them. Nearly as many Buprestidae have quite as great a variety of form; a considerable number of them are large and nearly all fairly preserved, some remarkably perfect; onespecies, *Chrysobothris Haydeni*, has been described. Elateridae are more abundant, numbering more than 100 specimens, many of them in beautiful condition; they are abundant in species, over 40 having been separated, and are mostly of a medium, none of a large size. Considerably over 100 specimens are to be referred to the Meloidae, Mordellidae, and Malacodermata, but the specimens do not appear to be very well preserved, although about 40 species may be distinguished. The Cerambycidae are very beautiful, furnishing 30 or more specimens, representing more than half as many species; one fine species of a new extinct genus, *Parolamia rudis*, has already been described, and there are others equally fine. There are a dozen or more species of Bruchidae, one of which, *Spermophagus vivificatus*, has been published. Chrysomelidae are not uncommon; thus far I have recognized about two dozen species among the 60 or 80 specimens; one, *Oryctoscirtetes protogaeus*, belonging to a new genus, has already been published. Nearly twenty species of Tenebrionidae have been separated, rarely represented by more than a single specimen each, and there are also a few (from 2 to 10 species each) of Silphidae, Histeridae, Dermestidae, Ptinidae, and Coccinellidae, and a single species each of Cleridae and Telephoridae, the latter already described under the name of *Chauliognathus pristinus*. Two species of Rhynchophora, *Anthonomus defossus* and *Eurhinus occultus*, have been described. I have already mentioned the predominance of this type in opposition to the European tertiaries. The species are very numerous, nearly 120 having been separated with over 500 specimens, and among them are a goodly number of large and fine species; but some of the minutest are most admirably preserved; especially is this true of the sculpturing of the thorax and elytra; no attempt, however, has yet been made to do more than rudely separate the species, so that no details can now be given.

Among Hemiptera, to which eleven plates will be devoted in the report in preparation, Heteroptera are somewhat more numerous than Homoptera, both in individuals and species. The Heteroptera present a great variety of forms, over 100 species having been detected, three-fourths of which can be referred to their proper place; they will occupy seven plates. Lygaeidae, Reduviidae, and Pentatomidae abound. Corimalaenidae of several species are very common; but the most common of all are one or two species of Alydina (one of the groups of Coreidae), comprising perhaps a third of all the Heteroptera. There are two species of Aradidae, and half a dozen specimens of a very pretty species of Tingis, well preserved; but in general the preservation of the Heteroptera is not so good as of the Homoptera. Very few water-bugs occur, but there are two or three species, among them a slender and very prettily marked Corixa. There are about 65 species of Homoptera, of which nearly one-half belong to the Cercopida. One genus, resembling Ptyelus, is represented by a dozen or more species, comprising together perhaps nine-tenths of all the Homoptera, some of the species being represented by 40 or 50 specimens. There are a few large Fulgoridae; one has the long recurved process of the head almost perfectly preserved. Two gigantic Aphrophorina have already been described as belonging to a new genus, and been named *Petrolystra gigantea* and *P. heros*; but as a whole the species are of medium size, with some minute and slender forms, the position of which is as yet undetermined. Plant-lice are common, and include probably 8 species, all Aphidiinae excepting one, which is referred to Schizoneuridae; an entire plate is devoted to them. Many of the Homoptera have their markings beautifully preserved; especially is this the case in a variegated Typhlocypha or allied genus, and the venation of others is as complete as in the living form. No Stridulantia have occurred.

Sixty or seventy specimens of Orthoptera have been found, all the families being represented excepting Gryllidae and Mantides. Six specimens and nearly as many species of Locustariae are present; the finest, belonging to a new genus, has been described under the name of *Lithymnetes guttatus.* There are about the same number of Acridii, a single species of Phasmida, and two or three Blattariae, one of which has been described under the name of *Homoeogamia ventriosus.* But the mass of Orthoptera, including about 50 specimens and 8 to 10 species, belong to the Forficulariae; two of them, *Labidura tertiaria* and *L. lithophila*, have been described, but they are among the least interesting, several of the species exhibiting forceps of very great length; an entire plate has been devoted to them in a forthcoming report, and the remaining Orthoptera will occupy another.

The Neuroptera are made up in large part of Phryganidae, but no larval cases have been preserved; there are about 100 specimens representing 15 or 20 species which are determinable, and which occupy one plate of the report and parts of others; besides these there are several hundred which perhaps a severer study will classify; one species has wings 2 centimeters long, while others are minute; several of the subfamilies appear to be represented, true Phryganidae certainly, and probably Rhyacophilidae, Leptoceridae, and Hydropsychidae. A single fine species of Panorpidae has been found, forming a new genus, and already described as *Holcorpa maculosa.* Seven or eight species of Plannipennia, including fifteen specimens, occupy a plate by themselves; they mostly belong to Raphidia and Nothochrysa, or to new genera nearly allied to them or to Chrysopa and Nymphon. A dozen specimens of Odonata have occurred, among them two species each of Aeschna, Agrion, and a new genus allied to Podagrion and Dysagrion (the latter of the Green River shales), which I shall call Lithagrion; the wings are preserved, some of them most exquisitely; besides these two larvae, one of an Aeschna, the other of an Agrion. A single adult specimen and one or two larvae of Ephemeridae have occurred; a single species of Perlidae, represented by adult specimens and others by immature individuals; and a single Lepisma. 26 specimens of Termitina have been found, belonging to six species and three genera; among the specimens is a single worker, with one exception the only one that has ever been found fossil; four of the species and two genera belong to the section with branched, the others to that with unbranched scapular vein. This is the same proportion as holds with the sixteen species of the European tertiaries, where eleven belong to the first, five to the second section; of living types, on the contrary, only 35 per cent. belong to the first, 65 per cent. to the second section. Three of the species belong to a distinct genus which I call Parotermes, apparently peculiar to America, but possibly including some from the European tertiaries; another is doubtfully referred to Hodotermes, which has furnished fossil species from several localities in Europe, as well as among living forms; while the other two probably belong to Eutermes and are allied to species from Radoboj, placed with many modern types in this group. Calotermes, which has furnished species from amber and the Rhenish basin; Termopsis, which has more fossil (amber) species than recent; and Termes proper, which is represented at Oeningen and Radoboj, as well as in amber and on the Rhine—all seem to be wanting at Florissant; the composition of the tertiary white-ant fauna of of Florissant therefore differs considerably from that of any locality in Europe; but it most nearly resembles that of Radoboj in Croatia, where a like number of species has been found.

A single plate is devoted to the Arachnida, of which there are about 30 species and more than 70 specimens; all of them are Araneae; they have not yet been carefully studied, but fully half of them appear to be Epeirinae; of the others there are from three to five species each of Theridioidae, Drassoidae, and Thomisinae, and one or two each of Agalenoidae, Dysderoidae, and perhaps Attoidae; they belong, therefore, mostly to the highest groups. Among the Epeirinae is one genus represented by several species, which seems distinct from any that have been characterized; it is a compact, short-legged form, whose front and second legs are remarkably stout. Unfortunately the eyes are scarcely ever preserved in any of these fossils and the correct determination of their affinities rendered much more difficult and uncertain. There is one striking form, a species of Nephila, with spreading bunches of hair on its legs as in our *N. plumipes*, but yet differing decidedly from that. As a whole the arachnid-fauna appears rather uninteresting, and to have few features in common with that of the Prussian amber.

The only Myriapod is a large species of Iulus, represented by half a dozen fragments, in which only the body segments are preserved.

Finally there is an odd form of animal, which although abundant and tolerably preserved is still of doubtful position. It is flattened onisciform in shape, the body generally arched, and appears to be formed of only four nearly equal segments; each of the first three bears a pair of long swimming (?) legs bearing a two-jointed tarsus armed with a single claw, both femur and tibia being compressed, expanded, and the latter fringed with hairs. The first segment has a median slit anteriorly, but there is no sign of a head on the 30 or 40 specimens examined, although the anterior portion of the alimentary canal appears to be extensile, being frequently preserved as protruding beyond the limits of the body and armed at the tip with a broken chitinous ring. There are no other mouth parts nor signs of eyes or antennæ. The abdomen is furnished at tip with a set of harder converging parts, which look as if they served the purpose of dragging the body backward. Larvae of any sort are exceedingly rare in the Florissant deposits, and there is no group known to me to which this seems to bear any similitude. There are sometimes faint indications of several joints to the abdomen, but when closely examined these appear to be illusory; and this would certainly exclude it from the Crustacea, unless indeed it belonged, as has been suggested to me by Professor Hyatt, to a parasitic type. It is from 8 to 10^{mm} long.

Animal remains besides those of insects are rare at Florissant. The most abundant is a species of thin-shelled Planorbis, which is not uncommon, and always occurs in a more or less crushed condition; it is the only mollusk yet found there (excepting a single small specimen of a bivalve, referred to above in the section from the southern lake), and according to Dr. C. A. White is probably undescribed, although very similar to a species found in the Green River shales, differing from it principally in its smaller size.

Fishes rank next in numbers. Eight species have been found, belonging to four genera; of Amiidae we have *Amia scutata* and *A. dictyocephala;* of Cyprinodonts, *Trichophanes foliarum* and *T. Copei;* of Catostomidae, *Amyzon pandatum*, *A. commune*, and *A. fusiforme;* and of Siluridae, *Rhineastes pectinatus*. All the species have been described by Cope* excepting *T. Copei*, which was published by Osborn, Scott, and Speir.

Several bird's feathers have been found in these beds, and a single tolerably perfect Passerine bird, with bones and feathers, has been described by Mr. J. A. Allen under the name of *Palaeospiza bella*, and admirably illustrated by Blake. No other figure of a Florissant animal has yet been published. Besides these, Professor Cope has just described a plover, *Charedinus sheppardianus*, and writes that a finch is also found in these beds.

The plants, although less abundant than the insects, are exceedingly numerous, several thousand specimens having already passed through the hands of Mr. Leo Lesquereux. Of these he has published 37 species in his Tertiary Flora,† about two-fifths of which are considered identical with forms from the European Tertiaries. Of other specimens which he received after the publication of that volume, he has already given a cursory account in the annual report of Dr. Hayden's survey for 1876. He has also mentioned others in his review of Saporta's Monde des Plantes, and still others in letters. From these sources and from memoranda communicated by him based on the plates of the Florissant species prepared for the eighth volume of Hayden's Report, the following review is drawn:

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*See Bull. U. S. Geol. Surv. Terr. 2d ser., No. 1, pp. 3-5, 1875.

†Report U. S. Geol. Surv. Terr., vol. 7. 4to, Washington, 1878.

Among the exogenous plants the following polypetalous families are represented:

Some flowers with long stamens are referred doubtfully to the genus Bombax, one of the Malvaceae. Of Tiliaceae, a species of Tilia has been found; of Rutaceae, one species of Ailanthus. Of Anacardiaceae, three species of Rhus are described under the names *Evansi*, *rosaefolia*, and *Haydeni*, and three or four others mentioned. Of Juglandeae one species, and one of Zanthoxyleae. Of Rhamnaceae, *Paliurus Florissanti* is the only species. A few leaves of Celastrus represent the Celastraceae. The Sapindaceae are very abundant, three genera occurring; leaves of *Staphylea acuminata*, numerous specimens of *Sapindus stellariaefolius* and *S. angustifolius*, as well as of two or three other species of the same genus, and two species of Acer, represented by flowers, leaves, and fruit. The flora has a large number of Leguminosae, of the genera Robinia, Colutea, and Cassia, besides *Acacia septentrionalis* and *Mimosites linearifolius*, described in the report mentioned. The Rosaceae show a Prunus, leaves of Rosa, and species of Spiraea, with very finely preserved leaves of an Amelanchier, scarcely distinguishable from some of the varieties of the living species. *Liquidambar europaeum* Al. Br. represents the Hamamelidae; numerous leaves of Weinmannia, the Corniculeae; and, finally, there is a single species of Araliaceae, closely allied to *Aralia multifida* Sap. Excepting the Liquidambar none of the Polypetalae have been shown to be identical with European forms.

Among the monopetalous plants the Ericaceae are represented by *Vaccinium reticulatum* Al. Br., together with one or two species of Andromeda. Two species of Ilex, one described as *I. subdenticulata*, represent the Aquifoliaceae; one of Diospyros, the Ebenaceae; a species of Catalpa, the Bignonaceae. Oleaceae have a flowering branch of Olea and four species of Fraxinus, one referred to Heer's *F. praedicta* and another described as new under the name of *F. Brownelli*.

The apetalous angiosperms show a great variety of forms at Florissant, and among them many are referred to species from foreign tertiaries. Urticacea are the most numerous of all plants; three species of Ulmus occur, *U. tenuinervis* Lesq., peculiar to Florissant, *U. Braunii* Heer and *U. Fischeri* Heer, both from the European tertiaries; of Celtis there are leaves having a close affinity to the existing *C. occidentalis* and its variety *integrifolia* Nutt.; they may, however, represent two species; a single species of Ficus represents a European form, *F. lanceolata* Heer; but the mass of specimens—nearly or quite one-half of all that have been brought from this locality—represent species of Planera; Lesquereux states that he has at least two thousand specimens of "leaves of *Planera longifolia* [Lesq.] and of its varieties, which come near *Planeri Ungeri* [Ettingsh.], and perhaps another species of the same genus." The Juglandaceae are represented by single specimens of *Juglans thermalis** and *Pterocarya americana*, besides species of Palaeocarya and Engelhardtia. The six Cupuliferae recorded are all European species, viz: *Quercus neriifolia* Al. Br., *Q. drymeja* Ung., *Q. salicina* Sap., *Q. antecedens* Sap., *Carpinus grandis* Ung., and *C. pyramidalis* Heer. The Myricaceae are the next most abundant type after Planera, being represented especially by *Myrica acuminata* Ung., and *Callicoma microphylla* Ettingsh. (a true Myrica), both European species; there are, besides, no less than seven other species of Myrica, one of them referable to the European species, *M. Ludwigi* Schimp., another to a variety, *acutiloba*, of another European species, *M. latiloba* Heer; but the others new and either considered allied to *M. Zaccharienais* Sap. and *M. arguta* Sap. of the beds at Aix in Provence, or described under the names *M. Copeana*, *M. Bolanderi*, and *M. insignis;* of the last, two specimens are mentioned; of the other two, only one. Of Betulaceae, Betula and Alnus are represented by a single species each, *Betula dryadum* Brongn. and *Alnus Kefersteinii* Göpp., both again European forms; cones of the latter are found. Salicaceae are tolerably abundant, Salix and Populus being represented by four species each; the four species of Salix are all identified as belonging to forms previously described from Europe or Alaska, viz: *S. Lavateri* Heer, *S. integra* Göpp., *S. media* Heer, and *S. varians* Göpp.; one species of Populus is referred to *P. latior* Al. Br., of the variety represented by Heer as *denticulata;* two others are considered new, one belonging to the section of *P. glandulifera* Heer; while the fourth, represented by a large number of leaves, very variable, especially in size, is considered as identical with *P. Heerii* Sap. of the gypsum beds of Aix. Finally, of undetermined plants in this group, there is a species of Trilobium, and a Carpites, described as *C. Pealei.*

Among the Coniferae there is considerable variety, five species occurring, of four genera, all but one of the species represented in the European flora. There is, first, *Pinus palaeostrobus ?* Ettingsh.; next, well-preserved branches of *Taxodium distichum miocenicum* Heer; and abundant remains of *Glyptostrobus Europaeus* Heer; as well as two species of Sequoia, *S. Langsdorffii* Brongn., and *S. affinis* Lesq. The presence of the last-named genus is also well attested by the remains of gigantic silicified trunks in an erect position.

Finally, in the lower orders of plants, the following have been found: Of the Palms, a large specimen of a Sabal related to *Sabal major* Ung. of the European miocene; of the Araceae, *Acorus brachystachys* Heer, first described from Spitzenberg; of the Typhaceae, finely-preserved leaves of a Typha; of the Naiadaceae, two species of Potamegeton; of the Iridaceae, well-preserved leaves of an Iris; of the Gramineae, two fragments of leaves of Phragmites; of Filices, numerous specimens of a single species; of Rhizocarpae, many specimens of *Salvinia Alleni*, described from Florissant and Elko, Nev.; of Musci, *Hypnum Haydeni*, likewise known only from this locality; and of Characeae, two specimens of a Chara.

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* "Hot Springs, Middle Park," is the locality given in the text of Lesquereux's Tertiary Flora, but in the table, p. 327, it is also credited to Florissant.

M. Lesquereux has also found large numbers of leaves of a peculiar plant without any kind of neuration, which is apparently referable to the Proteeae.

We have thus from 90 to 100 species of plants already recognized from these Florissant beds, of which nearly half the species belong to the apetalous exogens. About 40 of the species are figured in the Tertiary Flora of Lesquereux.

According to this writer, such an assemblage of plants indicates a climate like that of the northern shores of the Gulf of Mexico at our epoch. "The preponderance of conifers, of shrubs, * * * of trees of small size, * * * gives to the flora a general aspect which recalls that of the vegetation of uplands or valleys of mountains." Palms are almost entirely absent, only a single specimen of one species of Sabal having occurred. "The leaves of some species are extremely numerous, none of them crumpled, folded, or rolled, as if driven by currents, but flat, as if they had been imbedded in the muddy surface of the bottom when falling from the trees or shrubs along the borders of a lake."

It is remarkable for the almost complete absence of hard fruits; and this, with the presence of flowers, of unripe carpels of elm and maple, and of well-preserved branches of Taxodium, which in the living species "are mostly detached and thrown upon the ground in winter time or early spring," led Mr. Lesquereux to believe that the deposition of the vegetable materials took place in the spring time, and that the lake gradually dried during summer.

To this we may add that the occurrence of Acorus, of Typha, and especially of Potamogeton, leads to the conclusion that the water of the lake was fresh, and not saline or brackish, equally proved by the fish, according to Cope, and by the presence of larvae of Odonata and other insects whose earlier stages are passed only in fresh water.

Neither the groups of fishes which have been found, nor the water-plants, the water-insects, nor the Planorbis exclude Mr. Lesquereux's suggestion of the annual drying of the body of the lake. Moreover, certain thin layers are found overlying coarser deposits, which are sun-cracked through and through; but on the other hand the thickness of the paper shales, upon which most of the fossil remains are found, and which are composed of uniform layers of triturated flakes of volcanic products, being necessarily the result of the long-continued action of water, excludes this idea. The structure of the rocks rather indicates a quiet deposition of the materials in an unruffled lake through long periods, interrupted at intervals by the influx of new lava-flows or the burying of the bottom sediments beneath heavy showers of volcanic ashes.

The testimony of the few fishes to the climate of the time is not unlike that of the plants, suggesting a climate, as Professor Cope informs me, like that at present found in latitude 35° in the United States; while the insects, from which, when they are completely studied, we may certainly draw more definite conclusions, appear from their general ensemble to prove a somewhat warmer climate. White ants are essentially a tropical family, only one or two out of eighty known species occurring north of latitude 40°. In North America only three have been recorded north of the border of the Gulf of Mexico, excepting on the Pacific coast, where one or two more extend as far as San Francisco. Two species, both belonging to the second section, are found in the valleys below Florissant, in 39° north latitude. Florissant itself is situated 2,500 meters above the sea, and the presence of so considerable a number of white ants embedded in its shales is indicative of a much warmer climate at the time of their entombment than the locality now enjoys. Investigation of other forms increases the weight of this evidence at every step, for nearly all the species (very few, certainly, as yet) which have been carefully studied are found to be tropical or subtropical in nature. As, however, most of those studied have been selected for some striking feature, too much weight should not be given to this evidence.

As noted above, the superabundance of specimens of single species of plants (Planera and Myrica) is repeated in the insects, where certain species of Formicidae among Hymenoptera, of Bibionidae among Diptera, of Cercopida and of Alydina among Hemiptera are to be counted by fifties and hundreds.

The only other general feature which may already be noted among the insects is an unexpected paucity of aquatic larvae or the imagos of water-insects. Hardly a dozen neuropterous larvae have come to hand, very few aquatic Hemiptera in any stage, and of Hydrophilidae and other water-beetles no great number. The paucity of neuropterous larvae is the more remarkable from the abundance of Phryganidae, while not a a single larva-case has been found.

As to the age of these deposits, the opinions of Mr. Lesquereux, based on the study of tertiary plants, and of Professor Cope, drawn from his knowledge of tertiary fishes, are far more harmonious than one would expect from their known divergence of view concerning the testimony of the fossils to the age of other tertiary beds in the West. Such disparity of ideas did hold at first, Mr. Lesquereux maintaining in his earlier notices of the flora the probability of its later miocene age; in the Tertiary Flora he placed it in the "Upper Green River" division of his "fourth group," together with the flora of Elko, Nev., the Green River beds being placed directly beneath them. In Hayden's report for 1876 he refers the Florissant deposits to the upper miocene. In his review of Saporta's Monde des Plantes,* while still considering it as miocene, he points out certain important relations which it bears to the flora of

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* Am. Journ. Sc. (3), xvii, 279.

Aix, in Provence, considered as eocene. But now, after a more careful revision, drawn from more extended sources, he writes that while, by the presence of many genera, "there is an evident relation of the Florissant flora with that of the European miocene, yet by the affinities and even identity of some of the species with those of the flora of the gypsum of Aix, which, according to Saporta, includes types related to those of the whole extent of the tertiaries from the upper cretaceous to the oligocene and above, I should rather refer this group to the lower miocene or oligocene."

Both Lesquereux and Cope agree in placing the Florissant beds at the same horizon as those of Elko, Nev., and also those directly below the Fish-cut beds at Green River, Wyoming. Lesquereux has identical species also from White river, Colo., among specimens communicated by Mr. Denton. Cope calls the Florissant and Elko deposits the Amyzon beds, from the prevalence of that type of fish, and refers them to the "later eocene or early miocene."

Mr. Clarence King places the Green River deposits in the middle eocene, but considers the Elko deposits of the same age.

We may therefore provisionally conclude, from the evidence afforded by the plants and vertebrates, that the Florissant beds belong in or near the oligocene.

At present no geological conclusions can be drawn from what is known of the insects. So far as specific and generic determination has proceeded, nothing identical has been found in the Green River and Florissant beds, but some remarkable affinities have been noticed. To attempt, however, to draw any conclusion as to the age of either of these deposits, and especially of that of Florissant, before a closer examination is made, would be folly. The entire series of fossil insects from the beds of Aix, Oeningen, and Radoboj requires a careful generic revision, the Coleoptera alone, perhaps, excepted, and until this is done it will be difficult to make much use of the information given us in the works of European authors. This should not be considered as reflecting upon the character of these works, for it must be remembered that they were nearly all completed thirty years ago and could not be expected to meet present demands. It is, indeed, not impossible that the richer American fields, the exploitation of which has only just begun, may yet be found the best basis for the study of the relationship of the tertiary insect faunas of Europe.

Art. XII.—Revision of the Genus Sciurus.

By Dr. E. L. Trouessart.[*]

[Translated, with Notes, by Dr. Elliott Coues, U. S. A.[†]]

The *Sciuridæ* now consist of the genera *Pteromys*, *Sciurus*, *Tamias*, *Cynomys*, *Spermophilus*, and *Arctomys*.[‡]

If from the true Squirrels be separated the Chipmunks, which form a separate genus (*Tamias*), well characterized by special habits, presence of cheek-pouches, and some other peculiarities in relation with subterranean mode of life, the genus *Sciurus* still consists of a large number of species occurring in all parts of the world excepting the Madagascan and Australian zoological regions.

Most modern authors likewise distinguish by the name *Xerus* certain African Squirrels notable for their almost entirely prickly pelage. But this characterizes nearly all the African species to some degree; and writers are far from agreeing as to what are species of *Xerus*, some including the greater number of African Squirrels in that genus, while others restrict it to three or four species. In the present state of our knowledge on this point, and until the African forms shall have been fully monographed,[§] we prefer to consider *Xerus* as a subgenus of *Sciurus*.

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[*] Extrait du Journal *Le Naturaliste*, No. 37, 1^{er} Octobre 1880, pp. 290–293, et tiré à part, in 8°, pp. 1–10, Paris, 1880.—Erratum à la "Revision du Genre Écureuil (Sciurus)." *Ibid.*, No. 40, 15 Novembre 1880, p. 315.

[[†] The editor's acknowledgments are due to the author for a copy of this interesting paper, in which numerous subdivisions of the genus *Sciurus* are proposed to be established. As the publications of the Survey have already included much matter relating to the American *Sciuridæ*, from the pen of Mr. J. A. Allen, it seems fitting to present Dr. Trouessart's studies in the same connection. (See Monogrs. N. A. Rodentia, 1877, pp. 931-939, and this Bulletin, Vol. iv, No. 4, 1878, pp. 877–887.) The substance of the author's "Erratum," not to be overlooked in using the "Revision," is incorporated in the body of this translation. The translator's notes are bracketed and signed.—C.]

[[‡] The last-named added in the "Erratum." No mention being made of *Sciuropterus*, we are left to infer that the author would consider that form as a subgenus only of *Pteromys*; from which, however, it would appear to be well distinguished.—C.]

[[§] The author's "Erratum" is chiefly occupied with a revision of the African species, based upon the almost simultaneous memoir of M. Huet, which is spoken of in the following terms: "At the very time that our article appeared in *Le Naturaliste*, M.

In 1867* J. E. Gray published a revision of *Sciurus* and of the genera which late writers have dismembered therefrom. But this article, in which the author very briefly describes numerous new species and proposes to name a number of subgeneric and other groups, is marred (*entaché*, soiled) by the defect inherent in nearly all the productions of this celebrated zoologist, the characters of his groups and subgenera being for the most part *imaginary*, so that species could be named which figure at the same time in two or three different sections under as many different names.

Among the most important and durable works are those which J. A. Allen† and E. R. Alston‡ have bestowed upon the squirrels of the two Americas. These writers enable us to reduce the number of well-defined species to 15, from upwards of 40 admitted by Gray in 1867.

The Asiatic Squirrels have latterly been the subject of works of the same kind. Schlegel, A. Milne-Edwards,|| and Anderson§ have shown the number of species to be far too large, and that the greater part of them were only based on the variations in pelage, often of great extent, which certain species present according to changes of season—variations observed in a general way throughout the genus, but which are more strongly pronounced in the species of Southern Asia and Malasia.

Such variations are in fact only an exaggeration of those known to occur in our European squirrel, *S. vulgaris*, of which the Siberian *Petit-gris*, the dark-colored *S. alpinus* of mountainous regions, and the tawny *S. persicus* of Asia Minor, are only seasonal or local varieties. The squirrels of tropical regions, especially in Asia, present extremely curious transition states of pelage (*livrées de passage*), the analogues of which are scarely to be found except among birds, but which have nevertheless given rise to many nominal species. Thus the several striped-flanked squirrels (*Écureuils à flancs rayés*, *S. rafflesi*, &c.), described as so many distinct species, only represent individuals in change of pelage of the single species for which the name *S. prevosti* Desm. should be retained. Previous to Gray's work, the French zoologist, Paul Gervais, had shown¶ that the form of the skull, with some other secondary characters, enables us to distinguish in *Sciurus* several small groups which correspond quite

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Huet, assistant naturalist of the Museum, published in the Archives of that establishment (new series, vol. iii, p. 131, 1880), under the title of "Recherches sur les Écureuils africaines," a monograph based on the national zoological collections. This important work meets the want we expressed in saying that our classification of the African species could only be provisional, until they should have been properly monographed." The modified synopsis of African Squirrels and their allies, which the author is led to give in consequence of M. Huet's researches, is in the present translation substituted for the original text.—C.]

*Ann. Mag. Nat. Hist., 3d ser., xx, pp. 270, 323, 415, 434.

†P. Z. S., 1878, p. 656.

‡Monogrs. N. A. Rodentia, 1877; Bull. U. S. Geol. & Geogr. Surv., iv, No. 4, 1878, p. 877.

|| Bull. Soc. Philom., 1877, p. 16.

§Anat. and Zool. Researches (Expcd. to West Yunnan), 1878, p. 214, *et seq.*

¶ Mag. de Zool., 1842, pp. 1-7.

closely with their geographical distribution. We recur to Gervais's classification in attempting in our turn to subdivide the genus into a certain number of natural groups which we call subgenera. Whenever possible we have retained the prior names of other authors, such as *Macroxus*, *Funambulus*, *Geosciurus*, *Spermosciurus;* but we differ with most late zoologists in their limitation and characterization. Since only subgeneric distinctions are in point, little inconvenience results from utilizing names usually considered as mere synonyms of *Sciurus* or of *Xerus*.

The characters which can be used to the best advantage are the nature of the pelage, the shape of the skull and number of premolars, the relative length of the tail, and others of the same kind.

As to the ear-tufts, used by Gray to separate the true *Sciuri* from his *Macroxi*, they are of no account, since species closely related in all other respects differ only in this feature, which in others, again, depends upon season.*

In certain intertropical species the shape of the tail is equally variable according to season, being cylindrical in the rainy season, corresponding to our winter, but becoming distichous in summer, or in the rutting season. There are, however, many species in which the tail is always cylindrical, while in others it becomes bushy but not distichous.

The pelage is equally variable according to season, as in mammals at large. The African Squirrels are nearly all remarkable for the harshness and bristly structure of the pelage, which is generally little mixed with under-fur, if at all, and thinly scattered on the belly, which is almost bare, at least in the warm season. The species of this region, moreover, require renewed study before the actual value of many of them and the limits of the genus *Xerus* can be determined. Certain South American species approach them in the stiff, bristly character of the pelage.

Upwards of 200 species of squirrels have been described; in our *Catalogue des Mammifères* and in the following *Synopsis* we reduce this figure to about 80. This number itself is probably too large, and will be in the end considerally reduced. A total of about 60 perfectly distinct species seems to us to be still nearer the truth; and this will probably be attained when the Asiatic and African species shall have been as thoroughly studied as those of America.

Genus **Sciurus** L.

Chars.—Two upper premolars, the first small, often deciduous or wanting; one under premolar. Limbs free; form fitted for agility. Skull with more or less salient post-orbital processes; infra-orbital foramen opening in front of the anterior fork of the zygoma; no cheek pouches. Ears and tail varying with the species. Three or four pairs of teats in most species; only two in the subgenus *Xerus*. Pelage varying in the different subgenera. Dental formula: I. $\frac{1-1}{1-1}$; M. $\frac{5-5}{4-4}$ (or $\frac{4-4}{4-4}$).

[* For example, among American species, the alleged *Sciurus castanonotus* of Baird.—C.]

The genus may be subdivided in the following manner:

I.—Squirrels of the Europæo-Asiatic Region.

A. Head rounded, short, and depressed; nose blunt (*rond*); tail* longer than body and head, broad and distichous (in the breeding pelage). Molars $\frac{4}{4}$. Size very large.—Subgenus Eosciurus, Trt., 1880.

Type: *Sciurus bicolor*, Sparrm., of Asia and Malasia. We place in this subgenus the following species, all of the same zoological region:

1. *bicolor*, Sparrm. (type).
2. *giganteus*, M'Clell.
3. *indicus*, Erxl.
4. *maximus*, Gm.
5. *macrurus*, Penn.

B. Head broad and short, depressed; tail broad, not distichous, but bushy (*en panache*), shorter than body and head. Incisors broad, rounded, finely grooved lengthwise on their front face. Molars $\frac{5}{4}$. Of large or medium size.—Subgenus Reithrosciurus, Gray, 1867.

Two Malasian species:

1. *macrotis*, Gray (type).
2. *microtis*, Jentink.

C. Head rounded, with the facial region more compressed, the interorbital region less contracted ? (*le chanfrein moins busqué*) than in the preceding; tail terete or scarcely distichous, about as long as the body. Molars $\frac{5}{4}$. Of medium size.—Subgenus Heterosciurus, Trt., 1880.

Of Asia and Malasia:

1. *erythræus*, Pall., *ferrugineus* F. Cuv. (type).
2. *hippurus*, Is. Geoffr.
3. *prevosti*, Desm.
4. *lokrioïdes*, Hodgs.
5. *lokriah*, Hodgs.
6. *leucomus*, Müll.
7. *alstoni*, Anders.
8. *pernyi*, A. Milne-Edw.
9. *rufigenys*, Blanf.
10. *modestus*, Müll. & Schleg.
11. *diardi* (Temm.), Jentink.
12. *chinensis*, Gray.
13. *tenuis*, Horsf.
14. *philippinensis*, Waterh.
15. *steeri*, Günth.
16. *rosembergi*, Jentink.
17. *murinus*, Müll. & Schleg.
18. *lis*, Temm.

D. Head short, rounded, with compressed interorbital region ? (*à chanfrein busqué*), the muzzle attenuated; tail rounded, cylindric, shorter than the body. Molars $\frac{5}{4}$. Size very small.—Subgenus Nannosciurus, Trt., 1880.

Of Malasia:

1. *melanotis*, Müll. & Schleg. (type).
2. *exilis*, Müll. & Schleg.

E. Head lengthened, with narrowly-compressed muzzle; tail as long as or shorter than the body, cylindric. Molars $\frac{5}{4}$, the first upper premolar well developed. Pelage recalling *Tamias* in coloration, with dark dorsal stripes. Of medium and small size.—Subgenus FUNAMBULUS, Less., 1830.

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* Note.—The tail is measured *without* the terminal pencil of hairs which projects beyond the end of the vertebræ.

Of Asia and Malasia:

1. *berdmorii*, Blyth.
2. *quinquestriatus*, Anders.
3. *vittatus*, Raffles.
4. *plantani*, Ljung.
5. *palmarum*, L. (type).
6. *tristriatus*, Waterh.
7. *sublineatus*, Waterh.
8. *layardi*, Blyth.
9. *maclellandi*, Horsf.
10. *insignis*, F. Cuv.

F. Head lengthened, laterally compressed, muzzle narrow and elongate; nose acute; tail as long as the body, distichous and bushy. Lower incisors very long; molars $\frac{5}{4}$. Of medium size. Asia and Malasia.—Subgenus RHINOSCIURUS, Gray, 1843.

1. *davidianus*, A. Milne-Edw.
2. *laticaudatus*, Müll. & Schleg. (type).

G. Head short, broad posteriorly, the muzzle compressed, the interorbital region contracted? (*chanfrein busqué*); tail longer than body and head, bushy and distichous. Molars $\frac{5}{4}$.—Subgenus SCIURUS (restricted).

Only one species, widely distributed over all the northern part of the Europæo-Asiatic continent; from England to Japan, from Sweden and Russia to Spain and Greece, from Siberia to Asia Minor and Persia, in eastern Asia extending to the northern slope of the Himalaya plateau, and in northern China to the environs of Pekin.

1. *vulgaris*, L.

II.—AMERICAN SQUIRRELS.

H. Head rather long, little widened posteriorly, *à chanfrein busqué;* tail as long as the body, bushy and well haired, rarely distichous.[*] Molars $\frac{5}{4}$. Of medium or large size.—Subgenus NEOSCIURUS, Trt., 1880.

Of North America to Panama:

1. *carolinensis*, Gm.
2. *arizonensis*, Coues.
3. *griseoflavus*, Gray.
4. *aberti*, Woodh.
5. *fossor*, Peale (nec auct).[†]

I. Head lengthened, contracted? as in the preceding subgenus; tail broad and bushy, longer than the body. Molars $\frac{4}{4}$. Size large.—Subgenus PARASCIURUS, Trt., 1880.

One North American species:

1. *niger*, L.

J. Head lengthened, contracted? only behind the interorbital region which presents an interocular depression, compressed in the nasal region; tail generally rounded, cylindric, as long as the body. Molars $\frac{5}{4}$ in the young, but often $\frac{4}{4}$ in the adult, the rudimentary premolar being more or less speedily shed. Of medium or small size.—Subgenus MACROXUS, G. Cuv., 1825.

[[*] The tails of species here enumerated appear to be fairly distichous.—C.]

[[†] Is there any misunderstanding among authors respecting this well-marked species?—C.]

Of Central and South America:

1. *aureigaster*, G. Cuv.
2. *æstuans*, L. (type).
3. *hoffmanni*, Peters.
4. *deppii*, Peters.
5. *chrysurus*, Puch.
6. *pusillus*, É. Geoff.

K. Head lengthened; pelage coarse and stiff, scanty on the under parts; tail lengthened, rounded, rather slender in most species. Molars $\frac{5}{4}$. Of medium size.—Subgenus ECHINOSCIURUS, Trt., 1880.

Of Central and South America:

1. *variabilis*, Is. Geoffr.
2. *stramineus*, Eyd. & Soul.
3. *hypopyrrhus*, Wagl. (type).

L. Head lengthened; tail very short, slender, not more than $\frac{2}{3}$ as long as the body. Molars $\frac{5}{4}$, the first small and often caducous. A narrow dark stripe on the flanks. Of small size.—Subgenus TAMIASCIURUS, Trt., 1880.

One North American species:

1. *hudsonius*, Pall.

III.—AFRICAN SQUIRRELS.

M. Head oval, the front flat; muzzle short, the parietals inflated; tail cylindric and scant-haired, as long as or longer than the body. Molars $\frac{4}{4}$. Of medium or small size.—Subgenus HELIOSCIURUS, Trt., 1880

1. *stangeri*, Waterh (*calliurus*, Buch).
2. *gambianus*, Ogilby (*rufobrachiatus*, Waterh.; *maculatus* et *punctatus*, Temm).
3. *palliatus*, Peters.
4. *annulatus*, Desm. (type).
5. *multicolor*, Rüpp. (*cepapi*, Smith).
6. *abyssinicus* (Gm.), Prév.
7. *pyrrhopus*, É. Geoff. & F. Cuv.
8. *erythrogenys*, Waterh.
9. *bongensis*, Heugl.
10. *ochraceus*, Huet, 1880.
11. *poensis*, Smith (*olivaceus*, M.-Edw.)
12. *aubinni*, Gray.
13. *musculinus*, Temm.
14. *aubryi*, A. M.-Edw.
15. *sharpii*, Gray.
16. *pumilio*, Le C.
17. ? *minutus*, Du Chaillu.

N. Head short, oval; tail bushy, longer than the body; pelage very soft and abundant, striped lengthwise on the back as in *Funambulus*. Molars —? Of medium size.—Subgenus FUNISCIURUS, Trt., 1880.

One West African species:

1. *lemniscatus*, Le C. (*isabella*, Gray).

O. Head oval, lengthened; tail longer than head and body, generally well haired, distichous (at least during the rut); pelage harsh, dry, and brittle, often scattering on the belly, which is almost nude. Molars $\frac{5}{4}$. Of medium size.—Subgenus SPERMOSCIURUS, Less., 1836 (emend. Trt., 1880).

Of Africa and Southwestern Asia:

1. *gongicus*, Kuhl, (type).
2. *flavivittis*, Peters.
3. *getulus*, L. (*trivittatus*, Gray.)
4. *syriacus*, H. & E. (*fulvus*, Blanf.)

P. Head lengthened, front flat, post-orbital processes little developed; muzzled compressed; tail cylindric, longer than the body; ears very short and rudimentary. Fore claws strong and arcuate; pelage spiny, of bristly hairs mixed with flattened spines; belly naked; back striped. Molars $\frac{5}{4}$. Habits terrestrial. Size medium.—Subgenus GEOSCIURUS, H. Smith, 1849 (emend. Gray, 1867).

African:

1. *setosus*, Forst. (*capensis*, Thumb.).
2. *erythropus*, F. Cuv. (*leucumbrinus*, Rüpp.).

Q. Characters of the precedent still more strongly pronounced; pelage almost entirely composed of flat, grooved spines; back not striped; external genitals of the male highly developed. Habits terrestrial. Size medium.—Subgenus XERUS, Hemp. & Ehrenb., 1832 (emend. Gray, 1867).

African:

1. *rutilus*, Rüpp. (*brachyotus*, H. & E.; type).
2. *flavus*, A. M.-Edw.
3. *dabagala*, Heugl.
4. *fuscus*, Huet, 1880.

The three last subgenera together form the genus *Xerus* auct., notably of M. Huet (*loc. cit.*) and of Mr. Alston (*On the Classif. of the Order Glires*, P. Z. S., 1876, p. 77).

The complete synonyms of all these species will be given in our *Catalogue des Mammifères Vivants et Fossiles* (RODENTIA).

ART. XIII.—Osteology of the North American Tetraonidæ.

By R. W. Shufeldt, M. D., First Lieut. Med. Dept. U. S. A.

As far as the *Tetraonidæ* are represented in our avi-fauna, and the varieties are not few in number, there has been but little question among modern ornithologists as to the place they should occupy, and the manner in which they should be classified and arranged. In the writings of that distinguished naturalist, my friend Dr. Coues, we find him adhering to the excellent and natural division of the Family into the two subfamilies, *Tetraoninæ*, the true Grouse, and *Odontophorinæ*, the Partridges, with their genera and species, truly stating, as he does so, that the interrelation among the various representatives is so close that no violence is offered by the arrangement. Our labors have been confined principally to the study of the osteology of the Grouse, a complete collection of which we have before us, and in this memoir we will only occasionally refer to the osteological departures as observed in some of the Quails.

No country in the world can boast of a fairer collection of species of these noble birds than we find among the six North American genera, as seen in *Tetrao*, *Centrocercus*, *Pediœcetes*, *Cupidonia*, *Bonasa*, and *Lagopus*; and our Partridges yet exceed these in their brilliancy of plumage and oddity of some of their feathery decorations.

The anatomical peculiarities of the order *Gallinæ* has been the favorite theme of many an able writer, and we find Huxley, Owen, Gengenbaur, Coues, Parker, and others, in their several works, dwelling largely upon the osteology of these birds, ably exposing the observed characteristics of structure both by pen and pencil; but, as far as our knowledge extends, no one has as yet devoted himself to the production of a paper devoted exclusively to the osteology of the North American Grouse, such as the writer here proposes to undertake with every hope of success, aided as he has been by the kind assistance of many friends in different parts of the Union, in sending him valuable material in the way of representatives of the Family.

The author trusts that he may be allowed to carry out on some future occasion his present intention of devoting himself to the study of other systems of avian anatomy; in which event myology, the eye and ear, and respiratory apparatus, will all receive their due share of labor; but in this monograph we will omit, as we have in former ones now published, any detailed description of the osseous elements of the ear, or the respiratory tube, small sesamoids, or such tendons as may ossify in the extremities. The hyoid as an arch of one of the cranial vertebræ evidently is not included in this category, and will in consequence receive the attention it undoubtedly deserves in its proper place.

The study of the bones entering into the cranial vertebræ has been initiated at a stage in the chick's life a few days after birth, and their relation to each other and their development carried up to the adult bird. It will be observed after a glance at the writer's drawings in Plate V that he has chosen the young of that grand old prairie-loving Grouse, *Centrocercus urophasianus*, as an example of the growth of the skull from the time above referred to in the *Tetrœoninæ*.

In this plate the first three figures show respectively the skull of the young of the Sage Cock a few days after the parent has led it from the nest: 47 from above, 48 lateral view, with mandible, and 49 from below, the mandible removed.

Fig. 50 shows the bird in August of the same year, and Fig. 51 the disarticulated skull of the same, whereas in the next plate we observe the skull of an old cock of the same species that has, no doubt, trod the prairie for many a season. (Fig. 52).

In these birds the greatest amount of difference exists in point of size among the sexes and in individuals of various ages of the same sex; so we naturally find a corresponding amount of difference in the sizes of their crania.

Fig. 52 is the skull of an exceptionally large adult, ♂, chosen from a bevy of several hundred others, with a view of affording the reader the opportunity of seeing the proportions this Grouse may attain, as far as this part of its skeleton is concerned. This peculiarity seems to be confined to *Centrocercus*, and does not obtain with the other varieties, they seemingly arriving at maturity of growth at a much earlier period of their existence. *Tetrao obscurus* may form an exception to these remarks, but it is certain that it is not by any means so striking a characteristic in this bird. Another interesting point to be observed here, that no doubt has forced itself upon the reader since his inspection of the plates already introduced, is the unusual length of time that the original bony segments of this Grouse's head retain their individuality, over others of the class. This is indeed so, and in birds of one or two years of age, if we exclude the epencephalic arch of the occipital vertebra, it is not an unusual occurrence to be able to distinguish all the sutural boundaries among the remaining elements, and these appear to be persistent when applied to the nasals and the premaxillary bone of very old birds. We are all well aware that this rule holds good in the common barn-yard fowl.

Students of the works of that eminent anatomist and observer, Owen, remember that in his Comparative Anatomy and Physiology of

Vertebrates he seems to accuse the *Struthionidæ* alone of this singular feature, or at least "those birds in which the power of flight is abrogated." Now, such of my readers as have had the opportunity of observing the flight of the "Cock of the Plains," after he has once been induced to take wing, will agree that there is anything save an abrogation of that avian privilege.

Crania of the North American *Tetraoninæ* being placed on the horizontal plane as described in my monograph on the osteology of *Eremophila alpestris* (Bull. U. S. Geol. and Geogr. Surv. of the Ters., vol. vi., No. 1), we observe that their equilibrium is moderately stable, the anterior bearing point being the tip of the superior mandible, and the two posterior bearing points being the external facets upon the tympanics. The angles of the foramina magna average 70° while the centrum of the parietal vertebræ is the chief bone of what here must be the basi-cranii, and is found to be nearly in the horizontal plane: the neural arch of the occipital vertebræ being, as a whole, gently convex outwards and lying in nearly the same plane with the foramina magna.

*The Skull.**—So distinct do we find the hæmal arch of the first cranial or occipital vertebræ, and fulfilling such a diverse end, with its appendage the pectoral limb, in birds generally, that its description will be undertaken further on under the subject of the "scapular arch" and our attention be engaged at this point only with the neural or epencepahlic arch of this segment of the cranium.

The primoidal elements of this, the superior arch of the vertebra in question are seen to a greater or less extent *in situ* in the young and "bird of the year" of *Centrocercus* in Plate V, Figs. 47–50, and in the disarticulated skull of the same, Fig. 51, as *so*, *eo*, *bo*, and *po*, lettering respectively the essential elements "superoccipital," "exoccipital" (the parial bone and counterpart of this segment being intentionally omitted, as are the duplicates of other segments), "basioccipital," and the connately developed process "paroccipital" of the neurapophyses.

In Sage Cocks the size of those figured in Plate V, Figs. 50 and 51, we find the neural spine of the first vertebra, *so*, to be a light, spongy bone, one and a half centimeters wide by about one-half of a centimeter deep—covered with a thin layer of compact substance. Its upper border displays in the median line a demi-lozenged shaped notch that when the bone meets the parietals, which latter have their posterior and inner corners deficient, forms in many birds of this age a "fontanelle." In younger individuals this diamond-shaped vacuity is always present, the "anterior fontanelle" being formed in them in a similar manner, though narrower and longer, between the frontals and parietals. The lower border of the superoccipital presents a smooth, angular depression, that in the articulated vertebra goes to complete the superior third of the foramen magnum.

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* The authors plates and figures illustrating this paper are numbered in continuation with others of his published monographs.

The lateral bodies of this bone are cellular masses with several apertures opening forwards and outwards, the mastoids closing them in, in the completed cranium. On its outer surface near the inferior angles we observe two, one on either side, grooved foramina, leading upwards and inwards, to open into the lateral sinuses on the inner surface of the segment, nearer together. As age advances these canals contract, but still exist throughout life.

The basioccipital segment, *bo*, also is largely cancellous in structure, wedged shaped, having at its apex a long, rounded tubercle curving outwards and backwards, overhanging a slight depression beneath it. This tubercle in the complete vertebra forms the middle two-thirds of the occipital condyle, which, in the adult, is found below the foramen magnum, sessile, uniform in outline, with the rounded border below, and all indications of its original division into three parts obliterated.

The neurapophyses of this vertebra, termed the "exoccipitals" (Plate V, Fig. 51, *eo*), are each nearly as large as the neural spine; on their inner borders they present for examination the deeply-rounded margins to complete the foramen magnum, and immediately beneath, the minute tubercle jutting out that lends its assistance on either side to form the condyle of the occiput.

The outer angles, quadrate in outline, deflected slightly downwards, are the transverse processes of the vertebra, the "paroccipitals." The precondyloid foramina are also to be observed here, with one still more external, belonging to the group from which the eighth nerve makes its way from the cranium. The internal aspect of an exoccipital is a mass of open, irregular cells, that are closed in when this segment is approximated with the mastoid, superoccipital, and the "petrosal" (Fig. 51, 1), that odd-shaped and spongy bonelet which constitutes the capsule of the organ of hearing—and which has a foramen on its inner and smooth surface for the passage of the auditory nerve—forming, also, by a bending forwards of a part of this surface, and aided by the basi-sphenoid, the floor of the mesencephalic fossa on either side, while externally it shares in forming the entrance from without to the otocrane.

With the exception of the petrosal, the elements thus far described, when duly articulated, form the neural arch of the occipital vertebra, as already intimated above. The basioccipital, the centrum of this vertebra, by its larger extremity, and the exoccipitals with the connate diapophyses articulate with the basi-sphenoid in the basi-cranii below; the latter, with the superoccipital, meet the parietals and mastoids above and laterally. In old birds every trace, both sutural and otherwise, becomes completely obliterated as the osseous amalgamation progresses, though throughout the group a well-defined "superior line" limiting muscular attachment, indicates very nearly the terminating borders above, and sometimes, as in *Centrocercus*, a fainter indication exists in the vicinity of the union among the interested bones below. On either side of the condyle, to its outer aspect we observe in a slight depression a group of usually four foramina—two external opening into the otocrane, one into the cranial cavity, and one leading through the basi-sphenoid to the base of the 'sella turcica' at the carotid openings; they transmit principally the eighth nerve and the internal jugular and branches.

In some of the very old individuals of the *Tetraoninæ* quite a striking characteristic presents itself in the capaciousness of the opening to the otocrane, produced by a thin, wing-like expansion, recurved forwards, formed by the out-growing and union of the centrum of the second vertebra and the diapophysis of the first. This feature is not particularly noticeable in the *Odontophorinæ*, nor in *Lagopus*, *Cupidonia*, and *Bonasa*, still less so in the Sharp-tailed Grouse, among the *Tetraoninæ*, but quite marked in old males, especially in *Tetrao* and *Centrocercus* (Figs. 52, 74, 88, and 89). No very decided differences exist among the Grouse with regard to the foramen magnum and the occipital condyle; the former is universally of good size for its owner, subcircular, and without any encroachments upon its margins beyond the condyle. This latter, always sessile, occupies its usual position below the foramen, with its long axis placed horizontally, and so nearly approaching the typical haricot in form that one has no hesitancy in pronouncing it of a reniform outline. In all the Grouse, save *Tetrao* and *Centrocercus*, it slightly invades the marginal periphery of the great foramen of the occiput, and in all the excepted genera is more or less shortened transversely.

The second cranial segment constitutes the parietal vertebra, and its elements are shown in the same plate, Fig. 51, where indicators pass through its neural and hæmal arches, P. V and P. V^1: P. V as the mesencephalic arch, constituted in the complete cranium by the bones P, the parietal or neural spine, when linked with its fellow; *a. s.*, the alisphenoids, the neurapophyses; *m. s.*, the mastoids, the diapophyses; and *b. s.*, the basi-sphenoid, the centrum of the vertebra. The hæmal arch we see in the "hyoid," which here shares the same fate of its analogue in the occipital vertebra, insomuch as it is ununited to the superior arch by either osseous connection or by articulation, for in all living birds the hyoid, the well-known bony support of the tongue, depends entirely upon its muscular and ligamentous connections to retain its relations with the cranium. The manner in which the disjoined neural spine of the parietal vertebra goes to form the posterior fontanelle in the half-grown bird has already been sufficiently dwelt upon. The bone P, as detached in an individual of that age, is quadrilateral in outline, excessively spongy and light, owing to the paucity of compact substance over quite a large share of diploic tissue, which is chiefly deposited in a protuberance on its inner table, which protuberance, in union with the fellow of the opposite side of the complete cranial vault, forms two concave surfaces out of the remainder of the superficies, essential portions of the ep- and prosencephalic fossæ.

Superficially, these elements are smooth and convex, and in the adult, after consolidation, exhibit some faint evidence of a parietal eminence on either side, — more marked elevations, however, occurring in the spine of the vertebra beyond, immediately anterior to the suture termed in Anthropotomy the "coronal." With the exceptions of the tympano-mastoidal articulation and the connections between the mastoids and petrosals, the majority of the articulations of this vertebra in the mid-aged bird may be classed among the variety known and described in works upon human anatomy as the "squamosal," — the parietals being bevelled above to accommodate themselves to the frontals.

The alisphenoids are separated from each other mesially by nearly half a centimeter; above they meet the frontals, below the basi-sphenoid, and laterally the mastoids, — the lower and outer angles almost reaching the cup-shaped articulation for the tympanics. This segment seems to ossify from its borders towards the centre, leaving a foramen that is eventually closed in. On its mid and lower border it presents for examination the half of the "foramen ovale," which is completed by meeting the centrum of the vertebra. It is for the transmission of the trigeminal nerve into the orbital cavity. Laterally there is developed a quadrate apophysis (the parapophysis of the vertebra?), which joins with a similar, subsequently scale-like process coming from the mastoid, resulting in a foramen, cordate in outline above, elliptical below, between them, giving passage to the fibres of the temporal muscle, that is markedly characteristic of the *Tetraonidæ.*

Below the point of union this apophysis is triangular, with its apex pointing forwards and downwards, flat, with its inner surface looking forwards, upwards, and inwards. Internally, the alisphenoid is deeply concave. (Plate VI, Fig. 52, and other skulls illustrating this paper).

The external appearance of the *mastoid* is well shown in Plate V, Fig. 50, and as *m. s.*, Fig. 51. Internally, the half-cells observed close in by the aid of similar excavations in the segments of the occipital vertebra, the acoustic capsule; and a double-concave surface, assists in forming cranial fossæ.

We now come to examine the ornithic characters of one of the most interesting segments of the bird-skull, the centrum of the parietal vertebra, well termed by most ornithotomists and general anatomists as the basi-sphenoid. At an early date in the life of the chick (*Centrocercus* and others) this bone becomes confluent with the centrum of the frontal vertebra beyond; this confluence takes place, if we may be allowed to differ with such high authority as Owen, who makes the rather sweeping assertion "that the pit for the pituitary body marks the boundary" (Comp. Anat. and Phys. of the Vert., vol. ii, p. 45) in the following manner, and the sutural trace is yet discernible in young birds of the Family under discussion (Plate V, Fig. 51). The *pre-sphenoid* lies beneath a tuberous process projecting anteriorly from the latter bone, reaching *nearly* as far back as the carotid foramina. The combined bones, the centra of the two mid-cranial vertebræ, thus constitute the compound bone *basi-pre-sphenoid* of comparative anatomists.

Viewed from above we discover, proceeding from before backwards, in the median line, 1. The upper aspect of the apophysis just mentioned, and immediately to its rear the deep "sella turcica" with the osseous canals of the carotids opening into one foramen at its base; 2. Two smooth surfaces, one on either side and a little laterally, for the optic chiasma to rest upon; 3. Another surface still more posteriorly for the mesencephalic fossa, being perforated by diminutive parial foramina; 4. A roughened open space for the articulation, with the head of the wedge-like basi-occipital. Anteriorly and at the same time laterally, broad and uneven borders for the alisphenoids, with their smooth groovelets of the foramen ovale, while back of these again, on either posterior angle, a concave wing-like expansion, the terminations of the Eustachian tubes, that add to the parietes of the entrance of the otocrane. Below and superiorly, at the base of the junction of the two bones, we find the carotid foramina, with a depression between them mesially, and still lower down, slightly protected by an attenuated offshoot from beneath, the separate apertures of the anterior and buccal entrances of the Eustachian tubes.

The remaining surface, unbroken in character, extending posteriorly, goes to complete the basi-cranii. The coaptation of the elements forming the neural arch of the parietal vertebra is shown in Plate V, Figs. 47–50, their amalgamation in the adult in Plate VI, Fig. 52.

The entire importance of the hæmal arch of this vertebra depends upon the bony support it affords the tongue, and the niche it fills in the chain of problems of Philosophical Anatomy. In a fine specimen of an adult *Lagopus leucurus*, kindly presented me by Mr. Robert B. McLeod, then residing in Leadville, Colo., we find the following characteristics presented to us for examination, and they extend with little deviation to all the members of the family. The hyoid arch consists of, in the specimen under consideration, seven bones. The confluent ceratohyals and glossohyal, which latter is largely completed anteriorly by cartilage, form one segment; the ceratohyals diverge from each other smartly behind, and at their point of meeting afford the facette for the transverse trochlea surface on the basi-hyal. This last bone, the second in order, measures half a centimeter in length, being enlarged at both extremities, flattened from above downwards, the anterior end being fashioned to fulfill the purpose already mentioned, while the posterior and larger extremity presents two facettes, looking backwards and outwards, to articulate with the hypobranchial elements of the thyro-hyals. The third segment also meets this compound articulation at this point, a short urohyal, it too being completed at its posterior extremity by cartilage. The hypo- and cerato-branchial elements of the thyro-hyals make angles with each other and curve upwards in conformity with the basi-cranii.

The sub-cylindrical hypo-branchials are one and a half centimetres long, and connected with the posterior elements by quite long and intervening piece of cartilage of the same calibre; the smaller cerato-branchials also taper off behind with the same material.

This arch in the *Tetraonidæ* long remains almost entirely cartilaginous, the hypo-branchial elements alone being composed of bone, and a bird must be of quite an advanced age before he can boast of a complete osseous framework as forming a component part of his lingual apparatus.

The third cranial segment, now to be described, is the first of the series in the skull of any of the North American *Tetraonidæ* in which one of the autogenous elements seems to be generated by osseous extension from continuous parts of the vertebra. The bone in the young and half-grown Grouse is absent, but is eventually replaced in a manner that will be discussed further on. We will ask the reader here, however, need any one doubt or be daunted because an element is missing? There may still be a greater modification in the ultimate segment; yet who would question the claim of these cranial arches to their being defined as vertebræ—distorted and expanded to meet certain required ends, as they are —on such grounds? Would it be the student who has faithfully carried his observations from the embryo vertebra from the mid-column of the fish, stage after stage, till he has almost unconsciously passed through the multifarious segments described in the adult piscine head, then any of our lizards—or a tortoise, to man himself? Such a one well knows that in every living creature that can vaunt of a vertebral column, that that column's most perfect, complete, and typical segments and arches are found at its centre, and not at its poles. There are ways and modes more difficult in nature of comprehension, as all her students and lovers are well aware, than the fact that the pygostyle at one extreme of the avian skeleton is composed of one or more vertebræ, and the beak, the hæmal spines of two more at the other!

The neural arch of the vertebra now to be defined is the prosencephalic—its hæmal arch the "mandibular," as its hæmapophysis constitutes the lower jaw, termed "mandible" in avian skeletology.

The fusing of the centrum of this segment with the basi-sphenoid has already been elucidated; the rostrum thus formed is gently inclined upwards and forwards, grooved along its entire superior aspect, tapering to a sharp point anteriorly to receive the connate prefrontals in the bony gutter at its distal third. Beneath it displays towards its base the parial facets for the pterygoids and beyond the rounded surface for the palatine articulation.

The *orbito-sphenoids*, as the neurapophyses of this arch, are the elements whose absence has already been hinted at above.

The author has taken members of this family in sufficient numbers and ages to convince him of the fact that the rotund foramen for the exit of the optic nerve from the brain-case and the smaller aperture for the first pair above, seen in the adult skull, has been slowly formed by osseous extension, chiefly from the ethmoid, frontals, and ali-sphenoids, and that the basi-sphenoid sends up on either side two delicate bony sprouts, that subsequently complete the periphery of the circular foramen for the oculomotorial nerve. This fact has been likewise carefully studied in the cranium of the common barn-yard fowl, and like conclusions arrived at. So that in Plate V. Fig. 51, this, as it occurs in some other birds, has been simply outlined and marked *os.;* in this same figure Fr. is the "frontal," *ps.* the prefrontal or centrum of the vertebra, and *x* the usual site for the postfrontal—this exogenous element, the diapophysis of the vertebra is not here found, its position being occupied by a depressed roughened surface for the squamous articulation of the mastoid. We have never personally examined any bird in our avi-fauna where this bone is seen independent. Descriptive ornithotomists, in their studies upon the skulls of *Rheidæ* and *Struthionidæ* give the presence of this process as occurring free.

The neural spine of the frontal vertebra follows the example of the parietal in being completely bifidated in the younger specimens. As a whole it is perhaps the largest segment in the bird-skull—certainly as far as our Grouse and Partridges are concerned. Either half of its spine presents projecting anteriorly from the middle a flattened process, directed gently forwards, downwards, and outwards; that at its extremity is marked above by quite an extensive surface for one of the nasals, and below by another, against which the head of the ethmoid abuts. The concave surface below this process and the remaining hinder moiety forms the vault of the orbit. Another scale-like projection is thrown out posteriorly, deeply concave within, correspondingly convex without, to shield the prosencephalic lobes—the bones being joined. Huxley terms the pleurapophysis of the hæmal arch of this segment the "quadrate"—the "os quadratum" of the older anatomists. Owen defined it as the *tympanic*, it being the homologue of a bone of the vertebral skull generally—it was the os carré, in birds, in the writings of the eminent Cuvier. The *tympanic* forms no exception here in the *Tetraonidæ* to birds of America generally, in being a free bone, of various shapes in divers families and genera. So symmetrical is it found to be in the Grouse, that little harm would be done, were such a step advisable, to appoint it as a type for the Class. The mastoidal and orbital arms are about of a length and calibre, the first being rather the larger, and is surmounted by a hemispherical articulating head for the cup on the lower border of the mastoid. The neck below the processes is moderately constricted before it expands to become the "mandibular" end, that has beneath, its transverse elliptical facet outwardly, the intervening notch and then the inner and smaller one, all for articulation with the mandible. The bone has likewise a surface to articulate with the pterygoid below the orbital process, and is always pneumatic. From the outer aspect of the mandibular extremity it supports its two appendages, the bony styles, termed "squamosal" and "malar"—the first by a diminutive "ball and socket" joint articulated in the usual manner. The "malar," as we know, is the mid-style of the "infraorbital bar"—the maxillary completing the connection anteriorly, and although upon superficial inspection of this striking ornithic feature of the lateral aspect of the skull, it seems to be firmly united in its schindylesial articulation, it simply requires ordinary maceration in the adult of any of the Grouse or Quails to have the three styles separate from each other and from their tympanic and intermaxillary connections.

The lower jaws of the *Tetraoninæ* are singularly alike in all their characteristics throughout the sub-family. The single bone is developed in the usual way by confluency of the "articular," "surangular," "angular," and "splenial" elements posteriorly, and the outer moiety by the "dentary" element, the hæmal spine. (Plate V. See explanation of plates for the above-described bones.)

The mandible in the adult has a gentle and increasing curvature downwards from the interangular vacuity forwards. The curvatures at the extremities of the symphysisial suture are both parabolic, the inner being the more open of the two. The interangular fenestra is a flattened ellipse, which has distinct sutural traces leading from it, indicating the borders of some of the original bits of bone of which it is composed.

The "coranoids" are but feebly developed and the articular ends not far below them; these latter have the usual pneumatic foramen at the ends of their in-pointed and blunt extremities, and sharp recurved processes behind, in a line with the rami of the jaw, which apophyses long remain in cartilage in immature birds. (Plate X, Fig. 71.)

On the lateral aspect of the bone, two muscular lines lead away from the coronoidal elevations. These last two mentioned features are universally characteristic of the *Tetraonidæ*; they are strongly marked in *Lagopus*. (Plate XIII, Fig. 88.) Minute foramina are found above and below near the dentary margins, and two quite prominent, one beyond the ramal fenestra on the inner surface of the jaw; still another just anterior to a small tubercle below the coronoids on the same aspect. The inferior ramal borders are markedly smooth and rounded, as are the under surfaces of the articular ends where they originate in nearly the same plane.

The divergence of the ramal limbs of the mandible in *Odontophorinæ* is greater, owing to the greater width of the skull when compared with its length.

In some fine specimens of *Lophortyx Californicas*, generously furnished us by Mr. Charles A. Allen, of Nicasio, Marin County, California, we note the striking departure from the mandible in the Grouse in the absence of the interangular vacuity—this feature obtains, however, in the common Virginia Partridge and others. The deflection of the rami anteriorly is greater in these birds also, or at least more sudden, and so prominent are these ramal borders that the inner sides towards the posterior ends are converted into true fossæ.

Those interesting osseous and diminutive oblong plates, the *sclerotals*, present in so many of the class, are found here occupying their usual position. (Plate V, Fig. 51, 2, and Plate X, Fig. 75, in *Cupidonia*.) They number from thirteen to eighteen or twenty, and their function is so well known that it will not be dilated upon here. They differ principally in the amount of tenacity with which they retain their normal relation, after prolonged maceration. *Cupidonia* holds a high place here, and the fact seems to be due to the greater overlapping of the edges of these little affairs and the toughness, or perchance the thickness, of the internal and external sclerotic coats that cover them. Lately we saw in the case of *Sayornis nigricans* where these platelets were apparently confluent; no such condition ever occurs in the Grouse or Partridges.

The "lacrymal" (Plate V, Fig. 51, 3 and other figured skulls) is found on the anterior margin of the frontal, enjoying a free harmonial articulation that encroaches slightly on the nasal border. Each is a squamous, cordate lamella, with its larger end nearer the orbital cavity; this completes the bone in young birds, but in mature individuals it sends down a curved and delicate style with its point directed outwards, that encircles and gives support to the lacrymal duct on its passage to the rhinal cavity (*Centrocercus*).

We now come to examine into the last of the cranial vertebræ, and, in the family under consideration, the one most modified. It is the "nasal," and its neural arch the "rhinencephalic," the hæmal, the "maxillary."

In the *Tetraonidæ* its centrum, the "vomer," is missing. We make this assertion boldly, for, after careful scrutiny in the embryo, we find no special ossification for that segment, nor can we appropriate honestly any part of the pre-sphenoid to compensate for the deficiency, and we are the more convinced of the fact after examining crania of birds of different ages. It is absent. Whether this be due to the foreshortened skull of the Grouse, with its long sphenoidal rostrum rendering any further extension superfluous, we cannot say. In the lengthened skull of any of the *Anatidæ*, where such a bone is imperatively called for, as a sub-interspinal partition, it is invariably present, and unusually prominent (Plate V, Fig. 51, *vr.* vomer, is merely outlined to indicate its position in other birds).

The neurapophyses of the arch are found in the connate *prefrontals*, the bone called "ethmoid" in androtomy. It here, in the young bird, is lodged in the outer third of the groove on the pre-sphenoid, rises columnar, sub-compressed laterally, leaning forwards at a gentle angle to expand above in a trihedral summit for the support of the frontals, nasals, and intermaxillary, a short process being projected backwards for the former. The posterior aspect of the column develops as the bird grows, the interorbital septum, reaching to, and perhaps aiding in, the formation of the exogenous orbito-sphenoids.

The *nasals*, or the divided neural spine of the arch, are squamous lamella, twisted upon themselves in a manner to conform with the superior base of the beak, overlap the frontals as already defined, are separated from each other by the intermaxillary, throwing out below to meet this bone a sharp process, thus forming a broad elliptical boundary limiting the capacious osseous nares. In all adults of this family they are easily detached by maceration. These bones are well shown in Plate X, Figs. 71 and 73, in the cranium of *Cupidonia*, from an unusually fine bird sent with a number of others, for which our thanks are graciously tendered to Captain Richards Barnett, Medical Department United States Army. It will be observed that the bone becomes so attenuated in some specimens as to give rise to a foramen, as seen in the latter figure. The hæmal arch is ycleped "maxillary," as its lower rib and spine constitute the major share of the superior mandible or *maxilla*. The pleurapophyses seen in the *palatines* are long, rib-like bones with their anterior ends much flattened from above downwards, to fit into a fissure on either side made for them in the intermaxillary below the maxillaries. Near their middles they curve moderately outwards to develop compressed heads at their posterior extremities, fitting into a notch in either pterygoid, and concave mesially for the rostrum of the basi-sphenoid.

At their inner thirds they send off thin sheets of bone that curve upwards, barely to touch the ramphosial process of the sphenoid, accompanying it as far as it extends distad, then sloping away on the ribs of the bones themselves. The hæmapophysial maxillaries are elements that seldom change their ornithic characters, and in *Tetraonidæ* seem to be reduced to their simple typical form—in completing the delicate infraorbital bar on the one hand—and just previous to becoming wedged into the premaxillary above the palatines, dispatching a bony offshoot on either side nearly to meet each other in the palatine fissure on the other.

The remaining pair of bones found at the inferior aspect of the birds' skull are the *pterygoids*. In the Grouse they are stumpy, subcompressed concerns, with half-twisted shafts, having broad concave surfaces for the facets on the rostrum, which are notched distally for the reception of the palatines. The articulation with the tympanics is equally extensive, monopolizing long, narrow facets beneath the orbital processes on those bones.

We have arrived finally at the point in our descriptive skeletology of the avian skull, where we have to deal with the anterior and ultimate hæmal spine, here fulfilling most important functions as the superior mandible, as it does throughout the class at large. In *Tetraonidæ*, as in the vast majority of birds, the *intermaxillary* or the "premaxillary" of some authors is of much stouter material than most other bones of the head, its use, being a very obvious reason for this. (Plate V, Fig. 51, N. *Pf. mx*, *i.mx.*).

From the moderately free fronto-maxillary and pseudo hinge-joint, between the out-turned frontals, the culmen of this bone slopes by a gently increasing arc to the tip of the beak. This surface is rounded and split in two from the enlarged inner extremity to a point over the distal border of the nostril; this division lasts during life. The external nasal orifices are unusually large and sub-elliptical in outline. The head of the ethmoid shows in very young chicks, but is eventually covered by this bone, which also fills in snugly the internasal space (Plate X, Fig. 73).

The osseous maxillary tomia are even sharper than when they were capped with the horny integumental sheath that the entire bill wears during life; they are produced backwards on a triangular process of the bone below the shaft of the maxillaries, touching them in the Quails. A row of minute foramina encircle the beak anteriorly, where it is the thickest, though the segment is non-pneumatic. The general surface beneath is depressed below the tomial margins, though it is not very extensive, as the wide palatine fissure occupies a good part of the space, that terminates anteriorly in a U-shaped curve, opposite the outer nasal border. In the *Odontophorinæ* the curve of the culmen is more abrupt, and the frontals rise above, in some cases even jut over, the premaxillary. The nasal apertures are also very large and of a shorter elliptical outline; the palatine fissure is likewise narrower in comparison, a few of which differences are such as one would naturally look for in a bird of so near kin, and whose beak has been more than proportionately curtailed.

On removing the vault of the cranium in an adult female of *Centrocercus*, so as to obtain a free view of the brain-case, we discover the usual nervous and vascular foramina present at their most common sites, but beyond this we are more struck with the feebleness with which many of the salient points are developed, as compared with some of the other avian groups; we might sum it up by describing it as a lack of angularity and depth. It is true the various fossæ are well, though not strongly divided, the superior median crest is present but not very prominently developed, and the rhinencephalic fossa is barely conical. The section shows the greatest amount of deploic tissue to be in the basi-sphenoid, and bones of the occiput, where for potent reasons such material is most urgently in demand.

In the study of the crania of the adult *Tetraonidæ* as an entirety we find among the most conspicuous features enlisting our interest the unusual number of bones that remain free in them. The skull can be so stripped of its outstanding segments that nothing remains save the cephalic casket with the interorbital septum. The rhinal chamber is strikingly open, due to the great external nasal passages, and all its internal structures, as the ethmo-turbinals, internasal septum, and floor being formed only in cartilage. A pocket existing in the extremity of the premaxillary, that fills in with a spongy osseous tissue during life, is observed in *Centrocercus*, which is solid in the *Odontophorinæ* and *Lago-*

pus—parial, subcircular pits placed side by side in like locality in *Tetrao obscurus*.

The orbits are more fortunate in the completeness of their bony enclosures—the heavy plate generously extended by the ethmoid to divide these cavities very rarely shows any deficiencies. Of all the crania before us *Tetrao obscurus* is the only delinquent in this respect, though no doubt this may occur in others. In it quite a vacuity exists near the middle of this septum. Anteriorly the prefrontal and frontal throw out laterally squamous septa of greater or less completeness, that divide these cavities from the common rhinal space. These plates may coalesce with the processes of the lacrymal, as a rare coincidence, and perchance meet the infraorbital style. The foramina for the passage of the optic nerves and the first pair are, as a rule, singularly circular and distinct, the minor apertures about them enjoying a like individuality. They are noted for their greater patentcy among the Partridges.

A separate canal is devoted to each olfactory nerve immediately below the orbital vaults, that usually at its outstart from the cranial end has a small opening between it and the one of the opposite side. About the entrance to the otocrane we notice principally a rounded, squamous plate thrown down from above by the mastoid, that is present in all the Grouse. Just below and within, this segment also develops a sharp spicula of bone, posterior to the tympanic articulation, that evidently serves the purpose of keeping this free ossicle in its socket in certain movements of the jaw.

Peculiarities of the floor of this cavity have already been described above; in specimens of *Tetrao canadensis*, carefully selected for me by Mr. William Brewster, of Cambridge, Mass., and forwarded to me by Prof. J. A. Allen, of the Museum of Comparative Zoology, also of Cambridge, to whom my grateful acknowledgments are due for so many like favors, we find, upon viewing the skull from below, the elevations or convexities due to these ellipsoidal and wing-like formations, reminding one of their marked resemblance to the acoustic bullæ of the tympanic found among the crania of *Felidæ*.

The author in his various plates and figures believes he has given sufficient life size, as they all are, views of basal and superior aspects of the skulls of these birds, will not enter here into any needless details of measurements. The variation in size in this respect in *Centrocercus* has already been dwelt upon; it is not nearly so marked in other genera. The surface of the skulls above have a rough look caused by many minute depressions and groovelets, then running out to the margins of the orbits cause them in some to be finely serrated.

The Sharp-tailed Grouse is a unique exception to this, it being a bird of rather a delicate skull with smooth cranial superficies. All save *Centrocercus* possess rather depressed foreheads, apparently due more to a slight tilting upwards of the superior orbital peripheries. The lateral temporal fossæ are shallow and scarcely noticeable, the muscles they afford lodgment not being remarkable either for their size or strength.

Of the Vertebral Column.—In discussing the development and peculiarities of the vertebral column, we will still continue to adhere to *Centrocercus* as our model, explicitly stating names of other species when occasion requires a departure therefrom.

In examining the atlas and axis as they occur together in the chick a few days old, we find that the neurapophyses of the first have as yet failed to fairly meet above in the median line; though they may in some instances, as they undoubtedly do, soon touch each other. No ossific centre exists for an atlantal neural spine, as that process is not found upon this bone in any of the *Tetraonidæ*. Below the arch the interesting procedure is progressing in the appropriation of the centrum of this segment by the axis. The inferior extremities of the atlantal neurapophyses have inserted between them a circular ossicle whose plane is in the horizontal plane and on a level with the floor of the neural canal of the axis. This bonelet eventually becomes the "odontoid process" of the second vertebra. At this stage it is a little less than a millimeter in diameter, and in the adult occupying the same position remains a subsessile, and in comparison with the bulk of the bone it is attached to, an insignificant tubercle, though unquestionably fulfilling all the important functions required of it. In less than six weeks the odontoidal larceny is complete, and no trace remains to lead one to suspect how matters stood at the earlier date.

Immediately beneath and a little posterior to the primoidal and distinct centrum of the atlas, there is another, and still larger, free ossific centre, uniform in outline, concave above, surrounding the primitive odontoid apophysis with its long axis lying transversely; behind, and in contact with it, are two more very minute and elliptical ones placed side by side. The first of these unite with the atlas and latterly form the bony ring for the occipital condyle to revolve in, and the surface for the odontoid to move upon, and a notched lip of bone that projects from it behind, that subsequently develops—the remaining two, the anterior part of the body of the axis that bears the articulating surface for the first vertebra. In the full grown bird the postzygapophyses of the first vertebra projecting well to the rear look almost directly inward. They meet the prezygapophyses of the axis that face in a contrary direction and a little backwards. The articulating facet for the centrum of the axis is subelliptical, convex, of some size, and has in the segmented column the inferior and convex surface of the odontoid playing just above it, the superior and flat surface of the latter being confined by intervening and delicate ligament forming a part of the floor of the neural canal of this bone. In the axis of the adult the anterior part of the bone with the odontoid process, that was separately added, projects conspicuously forwards beyond the neural arch, and in birds of several months of age it can be distinctly discerned where the union was established between neurapophyses and centrum.

In the mature vertebra the neural canal is nearly circular. In the centre of the bone, above, a knob-like tubercle acts as the neural spine, which has mesially and behind a deep pitlet for the insertion of the interspinous ligament. Anapophysial tubercles are found above the postzygapophyses, which latter are of considerable size, concave, and faced downwards. The centrum of the axis is subcompressed from side to side and supports mesially, just anterior to the second vertebral articulation the first hypapophysis of the series. The first two segments of the vertebral column are non-pneumatic.

Vertebræ throughout the chain in the young chick invariably show the line of union between the centra and neurapophyses, but it is lost as soon as the birds come to be two or three months old. At this age, however, still very interesting points of development are strikingly visible in the third vertebra, which otherwise varies but slightly from the same bone in appearance as seen in the column of an old male, such as we have before us.

The neural spine, more compressed than in the axis, is nearer the middle of the vertebra, still deeply pitted for the interspinous ligament behind, and slightly so on its anterior margin. This characteristic becomes very faint among the long vertebræ in the middle of the neck, to be markedly reproduced as we approach the dorsals, the posterior depression always being by far the best defined. We find anapophysial tubercles still present in the third vertebra. These also exist throughout the cervical series, with more or less clearness; they form ridge-like lines upon the elongated segments of the mid-neck. The zygapophysial processes in general look upwards and inwards anteriorly, and *vice versa* behind—the fourth vertebra having in common with the one we are now describing an interzygapophysial bar, lending to these two segments that broad and solid appearance well known to ornithotomists, not possessed by any other of the cervicals. The neural canal in the third vertebra is nearly circular, which is also its form in the adult, becoming only moderately compressed from above downwards in the last three or four cervicals. Regarding the third vertebra from below, we observe that the articulating surface of the centrum for the axis to be quite concave and turned a little downwards. The processes that fall beneath the prezygapophyses form what would be a canal with its lateral margins; this groove, however, in the "bird of the year" is converted into the vertebral canal by an independent ossicle being placed over it on either side, and, being below the rest, it causes a broad shallow concavity to appear mesially and anteriorly.

These small bones have at the very outstart stumpy apophyses projecting backwards, and are the parapophyses of the vertebra—the projections they meet from above being the pleurapophyses, the groove they form mesially being the broad termination of the carotid canal.

The fourth vertebra has the same general appearance of the third, that we have just been describing; it is a little longer, however, and in both large pneumatic foramina are found laterally and beneath the diapophyses. These apertures are found in the vertebral canal in the remainder of the cervicals. Again, in both, the bodies are rather compressed from side to side, and it is not until the bird has arrived at maturity that the hypapophyses are well seen in these two segments.

Now, taking up the cervicals from the fifth vertebra, we find certain characteristics holding good throughout the series, with certain gradual modifications. In the adult the neural spine in the fifth is prominent and placed anteriorly; it slowly subsides to the tenth, where it is more tuberous, nearer the middle of the bone, and bears evidence of having a posterior projection overhanging the depression for the interspinous ligament. This is the type to include the thirteenth, the projection being more and more prominent and slightly cleft behind; in the fourteenth and fifteenth it suddenly assumes the broad quadrate spine of the dorsal type. Returning to the fifth vertebra, we note another change in the lengthening of the postzygapophyses; the acme of this modification is seen to be in the sixth and seventh vertebræ. From these they gradually shorten again, while the anterior ones spread out with the diapophyses to assume the form of the consolidated ones in mid-dorsal column. This arrangement allows lozenge-shaped apertures to exist between the segments above, and subelliptical ones laterally, that become smaller and more circular above as the postzygapophyses shorten, and quite large laterally as they approach the point opposite where the brachial plexus is thrown off from the myelon.

In the adult and old Cock of the Plains we detect beneath, in the fifth vertebra, well anteriorly, a strongly developed quadrate hypapophysis. This process entirely disappears in the sixth, for in this segment the centrum of the bone, anteriorly on either side, just where the paraopphyses meet the body mesiad, a tubercle commences to make its appearance, the apices slightly inclined towards each other. From the sixth to the tenth inclusive these apophyses become longer, approach each other below, but never meet so long as they have the "carotid canal," which they form between them. In the eleventh they seem to have met throughout their extent to form a hypapophysis on the exact site they occupy in the tenth, the tenth vertebra being the last cervical where there is any evidence of the carotid canal; hence from this method of formation Professor Owen is made to say (Comp. Anat. and Phys. of Vertebrates, vol. 11, p. 190), "In the Common Fowl each carotid * * * enters (ing) the canal formed by the hypapophyses."

In the completed twelfth vertebra of the mature bird we find this hypapophysis very large, with expanded extremity, and the parapophysis, on either side, sending down long subsquamous processes. In the thirteenth segment of the "bird of the year" the parapophyses begin to take on a change. This change develops in the adult still a perfect hypapophysis, but in the younger individual the parapophysial element begins to be notched anteriorly, a part favoring the pleurapophysis, a part the centrum, so that in the fourteenth vertebra of the adult the hypapophysis is still present anteriorly with a tubercle developing on either side of it, with the parietes of the vertebral canal very much slenderer. In examining this segment in the younger bird we ascertain that the original ossicle is now a descending pleurapophysis meeting the parapophysis, a delicate and independent process, which, in the fifteenth and last cervical vertebra, constitutes a free rib, while the hypapophysis consists of a mid-process and a smaller nodule on either side. This beautiful metamorphosis can be thoroughly studied and easily comprehended in the cervical portion of the vertebral column in our *Cathartes aura.*

So that, as a partial recapitulation of the first fifteen segments, we find that they make up the "cervical portion" of the column. Their centra are universally subcompressed at their middles, they develop in the young bird parapophysial projections that eventually produce free ribs by the aid of the descending pleurapophyses, and their interarticulations, as far as their bodies are concerned, bear out the general ornithic law of being apparently procœlous on vertical section and opisthocœlous on horizontal section.

Backwards from the fifteenth the vertebral segments or the links of the chain take on a metamorphosis that is characteristic of the *Tetraonidæ.* It consists in, in all the adults of the genera, a consolidation of the ensuing four vertebræ. The confluent bone thus formed constitutes the major part of the *dorsal* division of the spinal column and invariably supports free pleurapophyses (Plate VI, Fig. 55, Centrocercus, ad. ♂).

In *Centrocercus* these four vertebræ can easily be distinguished from each other until the bird is over a year old, but very soon after this all sutural traces are entirely obliterated and we have the segment as represented in the plate.

The neural spines become one long parallelogrammic plate, occasionally exhibiting a foramen or so at the site of the original interspinous spaces.

Its crest is rounded, but has no independent rim. Muscular fascia attached to it posteriorly often ossifies, leaving in the prepared skeleton flattened spiculæ, on either side, directed backwards. The anterior aspect of this bone has all the necessary elements to meet the last free vertebra beyond it. The first pair of diapophyses are the shortest, the last pair the longest and most raised; these processes are more or less bound together by metapophysial offshoots of variously defined serrate margins, that allow interdiapophysial vacuities to exist. Below, and just anterior to the bases of the diapophyses, are the four subelliptical and concave facets of the capitula of the dorsal pleurapophyses. From their upper and posterior points sharp crests run beneath the transverse processes to meet the out-turned and cordate facets at their extremities for the tubercula of the ribs. At regular intervals, and nearly in a right line among the diapophyses, are the elliptical orifices for the transmission of the dorsal nerves.

Pneumatic foramina are found about the bases of the transverse processes, the most anterior one being of some size.

The centra of these amalgamated vertebræ are very much compressed from side to side. This compression has its due influence upon the form of the neural tube within, while the bone below is produced downwards into an excessively thin and sharp crest, which is still further extended into four inverted T-shaped hypapophyses of large size. They join each other beneath to a greater or less degree in many of the genera. This union more frequently takes place between the first and second, and the first is always upturned and flanged out laterally, a feature prominently reproduced in *Lagopas* and *Bonasa*. These winglike side extensions of the lower margins of the hypapophyses not infrequently are continued on two or three consecutive ones, and are sometimes the widest on the second.—*Tetrao.*

Both in the Grouse and Partridges we find a free vertebra inserted between the compound bone we have just been discussing and the first sacral vertebra. This segment we must consider as belonging to the dorsal series, although in *Cupidonia* and *Pediœcetes* the upper and distal aspects of its diapophyses are more or less moulded to conform with the ilia. This bone is also figured in Plate VI, Fig 55, in conjunction with the other dorsals, with which it has all its characteristics in common, and such ones superadded as we might expect to find in a vertebra naturally disjointed in the middle of the column. It has the longest diapophyses of any of the series to which it belongs; facets for the tubercula and capitula of its own free pleurapophyses; a hypapophysis of no mean length that may or may not be expanded below.

Metapophysial spiculæ on its transverse processes sometimes are so far produced as to reach vertebræ before and behind it.

This segment is likewise pneumatic.

There is a wonderful vein of regularity running through the dorsal pleurapophyses, hæmapophyses, and hæmal spine or sternum. As to the first pleurapophysis, or rather the first pair of these bones, we have already described them as they are found in the ultimate cervical. There we are aware it never reaches the sternum by the intervention of a sternal rib; that they are usually found to possess thoroughly developed heads and tubercles for the vertebra, their shafts being less flattened than the dorsal ribs, and only in *Lagopus* did we discover any epipleural appendages.

As far as our observations extend, the consolidated portion of the column of the dorsum has always consisted of four vertebræ, and consequently we find in this portion four pairs of movable dorsal pleurapophyses and one pair for the free dorsal vertebra, reckoning five altogether for this region. The first pair of dorsal vertebral ribs terminate in free extremities, which are usually in line with the inter-hæma-pleurapophysial articulations in old specimens, and as a rule support epi-pleural appendages, characteristic of the species to which the rib belongs.

In the *Tetraonidæ*, following the general aphorism of the class, we observe a gradual dilation of the skeleton from the inter-coracoidal aperture towards the pelvic extremity of the body. To compensate, or rather what really gives rise to this, as far as the bird's osseous structure is concerned, among other things, is a lengthening of the diapophyses as we proceed in that direction. The ribs also become longer; the xiphoidal forks of the sternum flange outwards. So, too, we find a corresponding shrinking of the tubercula on the dorso-vertebral pleurapophyses, and a stretching of the correlative necks, so that the capitula may reach the facet intended for them on the vertebræ.

The vertebral ribs as seen in the Grouse are pneumatic, the foramina being found on the posterior aspect of these bones immediately below the tubercles, sheltered by the flattened bodies as they dilate in that region.

As in nearly all birds, these ribs are compressed from within outwards, and in *Centrocercus* are wider below the uncinate processes, contracting as they meet their sternal ribs. In these birds, too, the epi-pleural appendages are firmly knit to the body of the rib—though in *Bonasa*, *Lagopus*, and *Tetrao* they may be easily detached, leaving behind them in each case a shallow concave facet. In the last dorsal rib this appendage is the smallest, and is directed upwards nearly parallel with the body of the rib, and sometimes (*Centrocercus*) the edge of its rib swells out to meet its apex above; and this may have been the method by which the unique and remarkably striking uncinate appendages were formed in *Cupidonia*, a bird that constitutes itself an exception among the North American Grouse in this respect (Pl. XI, Figs. 79, 80), where not only the vertebral ribs are unusually broad, but their processes much more so, being great, odd, quadrate and compressed plates confluent with the body of the rib, and only rarely condescending to be weakened by the merest apology for a foramen to exist in them, as in Fig. 80. The Sharp-tailed Grouse appears to come next in approaching this state of affairs; it, too, invariably developing more or less expanded ribs. The only sacral pair of pleurapophyses conform to the general shape of the series to which they belong, and never support epi-pleural processes.

These bony protectors of the thoracic parietes were found to be exceedingly delicate in specimens of *Bonasa* kindly sent me by Leslie A. Lee, Esq., of Brunswick, Me.

Four hæmal ribs ascend from the costal borders of the sternum to meet the dorsal pleurapophyses in arthrodial articulations above the mid-horizontal plane of the bird's body. As is usual, their sternal ends are twisted so that the facets are situated transversely, while the upper extremities are broad and flat, particularly in *Cupidonia* and *Pediœcetes*.

The first pair are generally in advance of the others, and insert themselves higher up on the costal processes: The pneumatic foramina for these bones are to be found just above their tranverse facets anteriorly. The extremities of the hæmapophyses of the sacral ribs meet the posterior borders of the hæmal ribs of the last dorsal pair usually about the junction of their middle and lower thirds of the bodies of these bones.

The distal or upper extremities of these, the last pair of hæmapophyses, are sometimes very much expanded, and in a specimen of *Centrocercus*, ♀, a small bit of bone has been superadded, simulating an additional hæmal spine on either side, as if anticipating the descent of another pair of sacral ribs to protect this otherwise feebly guarded region of its owner's anatomy.

The short pair of xiphoidal processes overlap the ultimate sternal ribs of all the Grouse and Quails, on either side, as do the ilia the sacral pleurapophyses above.

The *Sternum*, in the North American *Tetraonidæ*, is developed from *five* points of ossification, and to these it seems to have added, later in life, or before the bone becomes one entire piece, an ossific centre at the extremity of each of the four lateral xiphoidal prolongations from which their subsequently dilated ends are produced. These later are easily to be demonstrated in the hæmal spine of *Centrocercus*, in the "bird of the year" (Plate VI, Figs. 53 and 56).

Fig. 53 represents the young of this last-named Grouse a day or so old, at which time all five of the primoidal points of development are eminently distinct. The "body" of the bone is nearly circular. The "keel," of which only the anterior part has as yet ossified, dips well down between the tender pectorals; the manubrium, now only in cartilage, has at this date no evidence of the foramen that later joins the coracoidal grooves. As to the rest, bands of delicate membranous tissue bind them loosely together. The sternum in a bird of several months' growth is shown in Fig. 56. Here the bone is rapidly assuming the shape it is destined to retain during life. The body and with it the keel is extending by generous deposition of bone tissue at its margins, principally at the mid-xiphoidal prolongation. The manubrium, still in cartilage, we find pierced at its base by the foramen just alluded to, and a rim of the same material runs about the anterior border of the *lophosteon*, Fig. 56, 4, while a rapidly diminishing band also connects the elements known at this stage as the *pleurosteon*, *ib.*, 6, and the *metosteon*, *ib.*, 5. In cases where severe maceration is resorted to with this bone, in still older specimens, in which the sutures are not suspected, these parts will still separate about the original points of ultimate union.

On the reverse side of the bone shown in Fig. 56 we find that even at this stage it is deeply perforated by the pneumatic foramen at a point immediately over the carinal ridge.

In the adult the sternum is highly pneumatic, air having access to it through such apertures not only at this point but also in the costal borders between the sternal ribs, and by a single foramen in the groove, posterior to the manubrial process mesiad.

Thus it is that this bone is generated, and as an entirety we are well aware that it represents the confluent hæmal spines of the free thoracic ribs, not developed in the order of a spine for a rib, completing the inverted hæmal arches separately, as in some vertebrates, which by their peculiar skeletal topography such niceties become feasible, but, as we have seen, and the fact is not new, by a fewer number of ossific centres, of necessity, due largely to idiosyncrasy of conformation as subservient to purpose, and a convergence of the inferior extremities of the several hæmapophyses to which, as a whole, it belongs.

In Plate VI, Figs. 52, 54, and 55 are all parts of the skeleton of the same bird—an old adult Sage Cock, *Centrocercus*—of which Fig. 54 is a view from below of the sternum.

It will be seen that it has a length of 14 centimetres, and other measurements can be easily obtained from it. We have never seen this bone any larger, and, as it is, it represents the maximum size the hæmal spine attains among North American Grouse. The bone is shown in other plates also, and their owners can be ascertained if the reader will kindly turn to the "Explanation of Plates" accompanying this paper.

The unique outline of the sternum of the *Gallinæ* has long been known, many authors having both figured and described it, and we will say here that in the *Tetraonidæ* of our country no marked deviations are to be noted from the more common type.

Anteriorly the manubrium juts out as a quadrate process with rounded angles; its inferior margin is continuous with a line that runs down between the slightly prominent carinal ridges, to become continuous below with the anterior carinal margin.

Above, the general surface of the sternal body extends over it. A subcircular foramen, connecting the coracoidal grooves, pierces it at its base. The coracoidal furrow, thus becoming one groove, is biconvex, being depressed mesiad behind the manubrium, in which depression another pneumatic foramen usually occurs. Their upper and lower margins are produced slightly outwards, the inferior being the sharper of the two.

The "costal processes" are exceedingly prominent, being bent over anteriorly at their apices, which are rounded. Behind them are observed the limited "costal borders," exhibiting the four transverse facets for the sternal ribs and pneumatic foramina. The "carina" or keel affords the greatest amount of osseous surface of the entire bone, greatly exceeding the body. Its lower margin is a long convex curve outwards, and the "carinal angle" protrudes forwards nearly as far as the manubrium, causing the anterior margin of the keel to be markedly concave.

The "carinal ridge" is thickened and heavy superiorly, where it limits or rather constitutes the boundary of the bone in that direction. Below it spreads out, and is gradually lost, *within* the boundary of the carinal border proper.

"Subcostal" and "pectoral ridges" are nearly always well defined.

The *superior* and *inferior* xiphoidal processes are very characteristic of the *Tetraonidæ*. They terminate by dilated extremities of nearly similar shapes, *Cupidonia* being an exception; the ends of the apophyses of the superior pair in this bird being rounded posteriorly (Plate XI, Fig. 82; see Plate XIII, Fig. 91, *Lagopus*, for the common pattern). These processes arise from a common stem, and their shafts are flat internally, with a raised ridge extending the entire length externally. The "body" of the sternum is, as a rule, very narrow, and notably concave anteriorly, becoming nearly flat behind, where it is produced beyond the keel for a greater or less distance.

The manner in which this part terminates varies in the different Grouse.

In *Centrocercus* it is nearly square across; in *Lagopus* roundly notched in the middle line, as it is in *Bonasa*; in *Tetrao canadensis* it is broadly cordate; while in *Tetrao obscurus*, *Cupidonia*, and *Pediœcetes* it is distinctly cuniform. The body is very narrow in *Bonasa*, approaching the *Odontophorinæ*, where it seems really to be nothing more than a good ribbon-like finish to the *superior* border of the keel. In these birds, too, we are struck with the double carinal margins anteriorly formed by the projecting ridges, and the long spicula-form costal processes that extend nearly half-way up the shafts of the coracoids.

So much do the sterni of the Grouse resemble one another in species of average size that it would puzzle one not a little to tell them apart if they were separated from the skeleton, and we were not allowed to examine them in connection with other diagnostic features of the osseous parts of the species to which they might belong.

Cupidonia and *Pediœcetes* are particularly alike, but the former could be recognized by its superior xiphoidal processes, *Bonasa* by the narrow body, *Centrocercus* by its size in the larger specimens, and so on.

We will still continue to consider such of the vertebral column as is confluent in the old bird, or rather such vertebræ as become confluent and are more or less embraced by the ossa innominata, as the sacrum, and composed of sacral vertebræ, attempting to make no such divisions as Professor Huxley did, in his Anatomy of Vertebrated Animals, of this compound bone.

There are sixteen of these segments that are to be so reckoned in *Centrocercus*, but it is only in the "bird of the year" that they can be counted with anything like accuracy, and even then great care must be exercised, and various pelves examined and compared with the younger birds at different stages and ages.

The first sacral vertebra possesses free pleurapophyses, whose hæmapophyses do not reach the costal borders of the sternum, but articulate in a manner to be described further on. Regarding the pelvis from below in *Centrocercus*, we note that the anterior four sacral vertebræ have their combined par- and diapophysial processes thrown out as braces against the expanded anterior iliac wings. After this the ilia change their form to accommodate themselves to the basin of the pelvis, which they assist in inclosing, and with this change the succeeding vertebræ have their diapophyses much elevated to meet the internal iliac margins. This section consumes four additional vertebræ, the centra of which go to make up the latter moiety of the cavity for the "ventricular dilatation" of the myelon, and they show the double foramina on either side, one above another, for the separate exit of the motor and sensory roots of the sacral plexus.

A double row, *i. e.*, one on either side of subcircular vacuities, exists here also among the transverse processes (Plate XIII, Fig. 90, *Tetrao canadensis*, ♂). It is through this portion of the sacrum that we observe in the chick the greatest amount of tardiness in sealing up of the neural tube above by the superior union of the engaged neurapophyses.

The remaining eight vertebræ become much compressed with expanded processes that rarely allow apertures to remain among them, forming an excellent mid-section to the broad and capacious pelvic cavity, with nearly all signs of its original formation obliterated on the outer and superior aspect.

The neural canal is distinctly circular as it enters the sacrum anteriorly, becoming only slightly flattened as it nears the coccyx. Above we find the neural spine confluent with the ilia anteriorly along its summit, and some additional bone deposited posteriorly in the way of their lateral plates, to bridge over the ample "ilio-neural" canals. Opposite the "gluteal ridges" the bones are yet firmly knit, but for the remaining part of the sacro-iliac suture the interested bones can be said only to snugly meet each other. *Cupidonia* alone has quite an interspace present (Plate XII, Figs. 83 and 84).

The sacral wedge is quite thoroughly permeated by air, which enters through foramina in the vertebræ in localities similarly situated to those described in speaking of the anterior part of the column.

In *Centrocercus* sometimes the first sacral vertebra bears a well-developed hypapophysis, and there may even be some evidence of this process on the second segment. The expanded extremities of these median processes are connected along their inferior margins by a delicate ligament of a firmer consistence than that membrane, which fills in the vacuities between the processes to which it is a limiting border. Now, it depends how far this ligament is conducted backwards as to how many of the anterior sacral vertebræ bear hypapophyses, as from its attachment to the hypapophysis (we have never seen it commence on the cervicals, though the directions assumed by their processes bear it out) of the first dorsal it completes a long shallow arc of an ellipse, in which the lower margins of the hypapophyses are found and assist to complete. This semi-osseous, semi-membranous, attenuated median plate dips down into the thoracic cavity in the living bird, for some little distance, as an interpneumonic septum.

The number of free caudal vertebræ in the adult Sage Cock is five, and to these is to be added the *pygostyle*. They all have pretty much the same general appearance, differing principally in the length of their outstanding transverse processes. In this respect the first and second are about equal; in the third and fourth two or three millimetres are added on either side, with a roughened tuberosity above; while the fifth and last is in appearance and size very much like the first. These diapophyses are rounded at their extremities, and all slightly deflected. The centra are transversely elliptical and of good size. The neurapophyses arise from them to inclose a subcircular neural canal, which is roofed over by the bifid and clubbed terminations of the elements, that hook or lean forward (Plate IX, Fig. 66; Plate XIII, Fig. 91). We have never observed an hypapophysis upon any of them; and all the elements and processes, as always occurs in the coccygeal series, are more or less imperfectly developed.

The *pygostyle* is an acute subcompressed triangle with tuberous base. Anteriorly and above it exhibits a bifurcated process that simulates the crests of the series; below this a shallow facet, for articulation with the last caudal, and a feeble subconical depression to protect the termination of the myelon between the two. Behind it has, at its lower angle, a deep groove, with a heavy bony rim or margin that shows a constriction near its middle (Plate IX, Fig. 65). This formation is easily explained when we come to examine the development of this compound appendage in the chick of a day or so old. This will reveal the fact that the pygostyle is composed of *three* vertebræ, that are fused together, distorted and modified as the bird grows, so as to eventually result in the bone we have before us.

There is nothing more interesting to the student of comparative anatomy than to study the serial skeletons of birds of divers ages, demonstrating and elucidating such a point as this, that could not be brought to light in any other way.

We will now offer a few remarks upon the vertebral column, as applied to others of the *North American Tetraonidæ.*

Of all the specimens examined, representing all the genera, the number of distinctly free vertebræ between the skull and the anchylosed dorsals has been found to be invariably fifteen, the last one supporting movably-articulated pleurapophyses, that in *Lagopus*, at least, possess small epi-pleural appendages. This portion of the spinal column, then, will constitute the cervical division, and in it we note that the third and fourth segments have interzygopophysial bars present, becoming so broad in the quails that the foramina they give rise to are sometimes very minute.

The pleurapophyses become long and sharp in some and more conspicuous than in others; this applies particularly to *Cupidonia* and *Pediœcetes.* The last cervical in the former has osseous spiculæ leading backwards from its neural spine and postzygapophyses, as in the anterior dorsals. In the same vertebræ the hypapophyses become confluent to form one broad process placed transversely with a mesial keel in front as the only indication of its original device.

The carotid canal seems to commence and terminate in the same vertebræ both in *Tetraoninæ* and *Odontophorinæ*.

Of the eminently characteristic dorsal bone little has to be said in addition to what has already been noted above. The number of vertebræ included in the anchylosis is never more nor less than four, and the first vertebral ribs have no hæmapophyses; so they never connect with the sternum, though they invariably bear uncinate processes, and in many species contribute a good share toward the stability of the thoracic parietes. The metapophysial processes vary principally in their extent: in *Bonasa*, *Cupidonia*, and *Pediœcetes*. In several specimens they nearly cover the tops of the diapophysial arms. In *Lagopus* a narrow bar defines them, connecting the extremities of the transverse processes with comparatively few offshoots. In *Tetrao canadensis* the bone is very long and delicate. In *T. obscurus* it has the same general appearance as in *Centrocercus*. The hypapophyses develop after the common type, but often irregularly; they are found to be missing on the ultimate segment or rather the pelvic end of the bone in the Quails.

The free and last dorsal may or may not have a hypapophysis; we believe it never does in the *Odontophorinæ*. It is overlapped by the ilia in *Cupidonia* and the Sharp-tailed Grouse. We find this to be a very marked feature in the last, and well marked among some of these birds sent me by Capt. James C. Merrill, Medical Department United States Army, from Fort Custer, Mont., at a time they were particularly acceptable, and when this erratic fowl became suddenly and unusually rare in many localities, so that the gift was reckoned at the time as more than valuable desiderata. As far as the sacral vertebræ are concerned, the same general plan seems to be carried out: sixteen seems to be the allotted number among the Grouse and, as a rule, among the Partridges. In these birds the sacrum, *i. e.*, the anchylosed sacral vertebræ, is much narrower, as is the entire pelvis, and much fewer perforations are to be seen among the dilated processes that go to meet the ossa innominata.

In *Cupidonia* and *Pediœcetes* the sacrum is very broad, conforming to a pelvis in these birds that will be described further on. We find in a specimen of *Tetrao canadensis*, for which we are greatly indebted to Mr. Manly Hardy, of Brewer, Me., where the sacro-iliac anchylosis is so perfect, and original land-marks so obscure, that one might easily imagine the pelvis in this individual as being developed from a very much fewer number of ossific centres. The caudal vertebræ number *five* in all the Grouse except *Cupidonia* and *Pediœcetes*, these birds each having distinctly *six* apiece. We would especially call the reader's attention to this fact, because when we come to discuss the pelves of these two birds, and recapitulate general skeletal data, it will be found that, as far as osteological simularities are concerned, they come *very* near to each other. The coccygeal vertebræ, otherwise, in common with the pygostyle, show very few differences worthy of record. In *Ortyx* and *Lophortyx* there are but four caudal vertebræ and the vomer is markedly acute and long. Occasionally the last segment is but feebly developed, as in *Lagopus*, where it may be a mere nodule; and in *Bonasa*, too, sometimes a sixth vertebra can be found, but usually requires force to detach it from the pygostyle, and in our specimens seems to be one of those that originally formed that bone—though we do not deny in the face of such evidence that specimens of the Ruffed Grouse may be found that possess six of these vertebræ.

Of the Scapular Arch and the pectoral limb.—This arch, with its concomitant, could have, with all propriety, been described in connection with its vertebra, but so distinct has it become, and so far removed in order to assist in carrying out such a notorious function as the bird's flight, that the author prefers to follow the general ruling of others by discussing it separately. Nothing could be more entertaining in the whole range of osteological research and study than the contemplation of the various avian shoulder girdles with their attached wing bones, particularly the former, as exemplifying the law of equilibrium between a bird's habits, the never-varying part it is to play in nature, and its skeleton or the framework that has been given it to carry that part out. This thought invariably enforces itself upon me in every instance after an examination of a collection of clavicles of different species of birds. It seems that there could not be an equipoise established anywhere in living nature more thoroughly compensatory than that 'twixt a bird's power and mode of flight, and its scapular arch and other bones about the chest—to meet it, more essentially the clavicles. See the broad, excessively pneumatic, yet robust, clavicular arch in any of the genus *Cathartes*, birds that sail aloft for hours apparently without fatigue, or the very simularly shaped arch in the Canada Goose, but in the latter for a very opposite style of sustained flight is non-pneumatic; the feeble and often ununited arch in *Spheotyto*, a bird with scarcely any pretentions to being a good flyer at all; in short one would, having a thorough knowledge of a bird's habits, be, in the vast majority of instances, able to guess very near as to the pattern of the furculum he would expect to find.

Now we have seen, in reviewing the skeletons of the Grouse, that in many points some of the species, if we disregard size, simulate each other very closely, as for instance in the various sterni and vertebræ. The clavicles of these birds form no exception to this rule, as far as general appearance goes. The common model is seen in Plate XII, Fig. 87, *Cupidonia*; but observe even here in these closely-related fowls how habit still tells upon skeletal characteristics. The broad, and not deep, pneumatic U-arch of *Cathartes* becomes the long non-pneumatic, almost acute, V-arch of the birds we are describing; so, in view of being familiar with the habits of the Sharp-tailed Grouse and Sage Cock, need one be surprised to find in the fourchette of the first a depth of 4 centimetres (omitting the inferior clavicular expansion), with an interspace of 2.5 centimetres separating the superior articulating extremities, as compared with the bone in the second, where the depth is 6.2 centimetres, and the interspace above only 1.7 centimetres.

The bones of this arch are easily taken apart by maceration, and as has already been hinted they resemble each other very closely among the genera. The posterior angle between *scapula* and *coracoid* averages for the species about 60°, and among the Grouse the distal end of the shoulder-blade is usually found to overhang the fourth dorsal pleurapophysis on either side; but in the California Quail these bones actually extend so far back as to overshadow the ilia for nearly a centimetre, they being proportionately narrow for their unusual length. This bone with the Grouse is only semi-pneumatic, its pneumaticity being confined to its coracoidal extremity, where the foramen is found in its usual site.

The blade is thin behind, becoming stouter as it nears the glenoid cavity, sharp along its inner border, rounded without, clubbed at its pelvic end, and turned gently outwards along its entire length. Anteriorly it contributes about one-third of the surface for the humeral joint, the coracoid the remaining two-thirds, while the acromial process within reaches forward barely to touch the clavicle, forming, as it does so, the usual interscapulo-coracoidal canal.

These bones are narrow in *Bonasa* and in *T. canadensis*, more curved in *Lagopus*, and very stout in *Centrocercus*, a good medium being seen in the Pinnated Grouse (Plate XII, Fig. 85).

The *coracoids* are quite stout bones, but devoid of any marked peculiarities; after leaving their sternal beds they extend upwards, forwards, and outwards, the furculum governing their distance apart at their upper ends. The glenoidal process is extensive, and rises nearly as high as the head of the bone; the clavicular process is faintly bifurcated, and curls over slightly towards the fellow of the opposite side. The shafts are compressed from before backwards, and soon dilate into broad expansions below; anteriorly one longitudinal muscular ridge marks the surface of the bone, while on the sternal aspect two or three very distinct ones occur. The inner angle of the dilated base nearly meets its fellow of the opposite side through the foramen, at the root of the manubrial process; from this corner outwards, for about two-thirds of the distance the surface is devoted to a curved articulating facet for the coracoidal groove, while the outer angle is tilted upwards and finished off by a distinctive little tubercle. On its posterior aspect, about the middle of the dilated part, a large, irregular pneumatic foramen is found in all the Grouse, but seems to be absent in the Partridges.

The position of the united clavicles, or the free acromial extensions of the scapulæ, is shown for *Lagopus* in my drawing in Fig. 91. Something has been said about this bone already; we will add, however, that the superior ends always terminate by rather tuberous enlargements, smooth internally, but uneven as applied to the clavicular processes of the coracoids. The shafts are gently curved, of even calibre, and fall nearly directly downwards in some species, to be slightly expanded beneath in order to give better support for the large median dilatation below; this is triangular in outline, thickened in front, sharpened behind. In *Ortyx* this process is sometimes produced backwards, so as to nearly touch the sternum; this feature obtains, also, among some of the other Quails.

These bones are all well advanced in ossification in the young chick, but do not develop their distinctive markings until a bird is pretty well along in age; this applies more particularly to muscular lines on the shafts, the base of the coracoids, and the clubbed extremities of the scapulæ. In *Bonasa*, where we noticed how the body of the sternum was narrow like the Quails, we find also the median process of the united clavicles produced backwards towards that bone. This Grouse's skeleton, in fact, seems to have the greatest tendency Partridge-ward over any other of the North American *Tetraoninæ*.

The free ossicle of the shoulder-joint, the *os humero-scapulare*, is not present in any of these birds; a firm piece of inelastic cartilage seems to supersede it and fulfill a like function.

The *humerus* (Plate VII, Fig. 57, H—Figs. 60, 61; also Plate X, Figs. 76, 77 *of Cupidonia*) of *Centrocercus* is so exceedingly regular that it could be well chosen as the type of that bone in all birds in which it is pneumatic. It is in due proportion for the size of the bird to which it belongs, possessing the usual sigmoidal curves from lateral and superior aspects (we describe the bone *in situ* in the closed wing) in graceful, though not decided, prominence. The head or proximal extremity, slightly bent anconad, displays the most usual points for examination about it; an extensive convex, smooth surface is seen for the glenoidal cavity, below it a deep notch, then the well-defined "ulnar crest" or lesser tuberosity curling over a large sub-elliptical pneumatic foramen, that is so patulous that the osseous trabeculæ and net-work are plainly seen at its base. The radial-crest encroaches but very little upon the shaft, is quite stout, and only at its summit shows any disposition to curve over palmad.

The shaft is smooth, markedly elliptical on section throughout its extent, and almost entirely devoid of any muscular markings or lines; it swells gently in the vertical plane as it approaches the distal end of the bone, upon which is placed the ordinary tubercles for articulation with radius and ulna. The inferior condyle, the internal of human anatomy, is the better developed of the two, and the ulnar tubercle is produced a little beyond the bone distally, while the oblique tubercle is brought down on the shaft. The olecranon fossa is rather shallow in the Grouse, being decidedly better shown among the Quails. There are no prominent points of difference in this bone among the *Tetraoninæ*, except in regard to size; *Cupidonia*, which has rather a heavy skeleton any way, the humerus is moderately robust in accordance.

In *Odontophorinæ* the same characteristics are to be seen; but we discover in addition at the proximal extremity of the bone, on its anconal aspect between the greater and lesser tuberosities, a deep fossa that has a great resemblance to the pneumatic orifice externally, and of about the same dimensions, being only separated from that depression by a thin bony wall; it seems to be designed simply for muscular insertion, and has no communication with the general cavity of the hollow humeral shaft.

The *radius* and *ulna* are also singularly typical in their avian characteristics, as might have been looked for after our remarks upon the bone of the brachium; their principal difference lies in their being non-pneumatic, although they are hollow like all long bones.

In the right arm of *Lagopus leucurus*, which we have before us, carefully dried, in its position of rest, with all the ligaments still attached, *in situ*, we find the *radius* to be unusually straight, in fact almost in line between the oblique tubercle of the humerus and the bone it meets in the carpus. Its shaft is nearly cylindrical, and shows a muscular line, upon an otherwise smooth surface, that travels along its proximal two-thirds beneath. Distally it overlaps the cubit by a transversely dilated extremity to articulate with its carpal bone. The head of the *ulna* is large, and betrays the fact that it belongs to a bird of considerable power of flight; the olecranon process is a blunt, tuberous apophysis, slightly bent anconad; the greater and lesser sigmoidal cavities are distinct and fairly marked, particularly the former.

The shaft of the bone is more than twice the bulk of that of its companion, decidedly convex outwards, the curve being greatest at the junction of the proximal and middle thirds; it is elliptical on section, the major axis of the ellipse being vertical. The muscular lines of the ulna are but faintly developed, as are the row of minute tubercles for the bases of the quills of the secondaries.

Anteriorly the bone displays its usual trochlea head for its own carpal segment; this surface is bounded palmad by a sharp and even curve, convex distally, while the inner articulating surface beneath the expanded end of the radius is uneven and applied to the concavities and convexities of the free pair of carpal elements.

These bones among the Partridges and other Grouse, except in size, present to us no extraordinary departures from the description just given of *Lagopus*.

We do not believe there is a bird in our country that can offer us better facilities for the study of the bones of the carpus than the young of *Centrocercus urophasianus*. Anchylosis of the various segments involved is exceedingly tardy, and it is not at all necessary for the student of this joint, that has puzzled so many comparative anatomists and ornithotomists, to seek the primoidal ossicles in the very young chick, unless he desires to ascertain the points as regards priority of ossification of the carpal bones, a question we will evade here entirely, for these bones are quite distinct and easily detached in the bird at six weeks or more of age, such as we offer our reader in the plates.

In the old and mature Sage Cock, the carpus has the appearance of this joint, as it is seen in nearly all of the class where there are two free carpal bones, and the os magnum confluent with the proximal extremity of the metacarpus, and the mode of articulation is the same. This we know to be, first, a free, six-sided, uneven bone, the *scaphoid*, articulating chiefly with the distal extremity of the radius and the metacarpus. This is the *scapho-lunar* of my former papers, and we retain the application here; it is also the *radiale* of Prof. Edward S. Morse, who has made such positive advances in the elucidation of the tarsus and carpus in birds.

The second bone is the *cuneiform*, larger than the first, and engaged principally by the cubit, but having also a process and an articulating surface for the confluent carpal and metacarpals; this is the *ulnare* of Morse.

These are the two carpals that remain free during life.

We will now devote ourselves to the joint as observed in the bird at six weeks of age. We have no trouble in finding *scapho-lunar* and *cuneiform* whatever. At the summit of the second metacarpal there is found a concavo-convex segment, that is universally taken to be the *os magnum*, termed also *carpale* by Morse (Plate VII, Fig. 59, *om*). It articulates anteriorly with the upper end of the index metacarpal, covers the entire proximal extremity of the second, and nearly or quite meets another bone behind that is grasped by *cuneiform*; this is the *unciform* (Plate VII, Figs. 57 and 59, *z*). It has the appearance of being a detached and bulbous extension of the third metacarpal, and is about the size and shape of an ordinary grain of rice, having a shallow concavity on its anconal aspect.

There is yet one perfectly free and distinct bone to be observed; it is found on the inner aspect, very near the extremity of second metacarpal, just below os magnum; it nearly meets unciform, and articulates with the process of cuneiform behind. This little segment is flat and very nearly circular, being applied by one of its surfaces against the shaft of the metacarpal, and held in position by ligaments. This segment we do not find described by any author known to us, and here call it the *pisiform*. The manner in which it eventually joins the metacarpus and the conformation it gives to that bone in the adult are shown in Plate VII, Fig. 58, and it is marked 8 in Fig. 59 of the young Sage Cock. The metacarpal for the index digit is likewise detached, although even at this early date it begins to assume a likeness to the bone as found in the adult.

Medius and annularis metacarpals are also distinctly free, and their size and position faithfully portrayed in the figure alluded to above. The prominent process on the rear and upper third of the shaft of medius of the adult is now found only in cartilage in the younger individual. The rest of the bony part of the pinion is familiar to all of us; it consists, in the adult "Cock of the Plains," as in all Grouse and the

Odontophorinæ, of a trihedral phalanx for the first metacarpal, constituting the *index;* two more for the medius metacarpal, the superior joint or phalanx having the usual expanded blade, with the long free and pointed finger-bone below; and finally the smallest phalanx of all, freely attached to the distal end of the third metacarpal or annularis.

These bones are non-pneumatic, as are all the bones beyond the brachium in the *Tetraonidæ.*

Of the Pelvis and the Pelvic limb.—After what we have said and seen in regard to the dilatory manner in which originally primitive elements, in these birds anchylose, and only after the lapse of weeks condescend to amalgamate and form the confluent bones and cavities that occur in the major division of the Class, we must not be surprised to find the same routine and a like tardiness exhibited in the pelvic hæmal arch, or the pelvis, and its appendage the lower extremity.

A glance at the figures illustrating the condition of the bones in question, of birds from one to two months old, will convince us at once that the rule still obtains; in them we find the sutures among the ossa innominata still ununited, and the three bones of either side of the pelvis independent, and easily detached from each other about the cotyloid ring.

In the young chick of *Centrocercus* (Plate VIII, Fig. 62), the ilium is a scale-like bone that rests against the sacral vertebræ. The pre-acetabular portion is excessively thin and delicate, and at this period constitutes the longest and widest part of the bone; its border mesiad bears no vertebral impressions, but is sharp and brittle; the outer margin is slightly rounded; this condition increasing as we near the diminutive acetabulum, where it is the stoutest. The distal margin, imperceptibly continuous with the inner presents a convex curve anteriorly; the included surface viewed from above has a general concave aspect, especially near its central portion. As we proceed backwards, however, it gradually becomes convex, to rise over the region opposite the cotyloid ring to form the general convex surface of the post-acetabular portion.

The distal margin of the bone is nearly square across, and does not extend as far back as the ischium, the two being bound together at this age by cartilage, which has been removed in the plate. The outer and anterior margin of this division of the bone is rounded and fashioned to the cotyle, the anterior half of which it eventually forms. From this point it arches backwards over the future ischiatic foramen. The inner margin of the post-acetabular portion is rather more rounded than its anterior extension, and directly opposite the "ring" presents for examination the depressions of the transverse processes of the ninth and tenth sacral vertebræ in elongated and concave facettes. The ninth vertebra met the ilia first; so we may consider the ilia as the pleurapophyses of the ninth sacral vertebra, and the ischia and pubic elements as the hæmapophyses and divided hæmal spine, respectively, as associate parts of the same arch, which arch has been exaggerated to meet a certain requisite need, the bony dorsal vault to shield the generative and urinary apparatuses and bear the pelvic limbs. This arch is so inclined that the remaining vertebræ soon, by their outgrowing apophyses, come in contact with it, ultimately fusing to develop the compound bone, usually termed sacrum. A good idea may be gained of the form of the ischium and os pubis by an inspection of Fig. 62, Plate VIII, at this stage of the bird's existence. For very obvious reasons the stoutest part of the ischiatic element surrounds the acetabulum; an inferior process, extending towards a similar one directed backwards by the ilium, grasps the head of the os pubis between them. From this point the ischium sends backwards a triangular thin plate, rounded behind, that is intermediate in length between ilium and pubis. This latter is satisfied to follow suit and direction by contributing a simple and diminutive spine. This crosses soon after the pubis has given its share to the cotylis, the obduratic notch of the ischium, converting, as the bones fuse, it into the obdurator foramen.

We give an additional figure in the Plate, 63, that exhibits the further advances of these elements towards maturity. The bird is now nearly two months old, and it will be seen that one after another the vertebræ impinge upon the iliac margins within. The ilia and ischia extend behind, including vertebra after vertebra, from a series that at this age might be easily taken for an extraordinary number of coccygeal segments. The head of the pubis at this time is entirely out of proportion with its rib-like extension, it having so spread and insinuated itself into the formation of the cotyloid ring as to form about one-fifth of its circumference. At this stage, too, the necessary cartilage begins to be thrown out to form the future anti-trochanter on the ilium.

So much for pelvic development; now let us examine this bony basin as it is seen in the full-grown representatives of the genera.

The manner in which the confluent sacral vertebræ meet the ossa innominata forming the ilio-neural canals and sacral sutures has already been defined above, so that here nothing more need be said of the midsection of the pelvis taken as a whole. We give among the plates figures of the pelves of *Centrocercus*, *Tetrao canadensis*, *Lagopus*, and *Cupidonia* from the skeletons of the adult birds, and if the reader will compare the lateral views given of the Ptarmigan and the Sage Cock he will see how few the differences are that exist between the two birds, and the same may be said, we assure you, for its superior and inferior views; in fact in the case of *Lagopus* it may be stated that its pelvis *in most instances* is the perfect miniature of this bone found in *Centrocercus* in all respects. This applies, also, though not quite as strictly, to *Tetrao* and *Bonasa*. Of course certain minor differences are easily to be picked out, such as a greater fulness there, as slightly deeper depression here, and so on; still our plate of *Tetrao canadensis* represents the general pattern of the pelvis among all the North American Grouse, save *Pediœcetes* and *Cupidonia*. In the superior aspect of this confluent bone in a fine specimen of *Tetrao obscurus*, we find the pre-acetabular portions of the ilia very much depressed below the general surface of the bone, and quite concave. The convex anterior borders are embellished with a flattened rim that bounds them, often produced forwards as two median sharp-pointed processes. The post-acetabular surface is raised, and including the sacrum forms a gently convex surface; the "gluteal ridges" dividing these two regions commence with the anterior iliac borders and are conveyed clear round to form the posterior ones of the same bones, describing two great Ss, the lower and outer curves of which pass by the acetabular projections, points where in some birds they terminate.

Among the principal features to be noted in a lateral view is that the shaft of the pubis is in nearly all instances free from the ischium after quitting the cotylis and forming the elliptical obdurator foramen. If it anchyloses with this bone at all it usually occurs just behind that orifice.

The ischium overlaps the pubis at two points—one quite broadly near its middle, and, again, by a process at its outer and inferior angle.

The "ischiatic foramen" is the largest vacuity of the group of three that here present themselves; its boundary is sub-elliptical, with its major axis depressed posteriorly if it were produced.

The cotyloïd cavity, or ring rather, is markedly circular, both its internal and external margins, the former of which is not a little smaller, thus affording a very good and quite extensive surface for the head of the femur; the anti-trochanterian process or facet directed backwards is likewise ample, so that the femora are well supplied with articulating surfaces.

There seems to be among the Grouse a predisposition for the ilia to overhang the region of the ischiadic foramina; it is most successfully carried out in *Cupidonia*. Viewed from below, we are struck with the amount of room and space these combined bones inclose; the profundity of the pelvic basin. This is very much enhanced by broad reduplicatures of the ilia and ischia behind, and a general though even constriction of a prominent rounded border or rather ridge that extends from the fourth diapophysial abutment of the vertebra against the ilia on either side to the outer angles of the ischia. Within, too, we often find about and at the base of these iliac fossæ apertures for the entrance of air into these bones; such pneumatic foramina are also seen beyond the os pubis and below the cotylis on either aspect.

The pubic extremities never meet behind, though in many species they are very long and usually take the curve given them by the ischia just before leaving these bones. Their distal extremities are flattened in *Centrocercus* and generally more expanded than among the other varieties.

The pelvis of *Cupidonia* is so different from the general description we have just given that the author felt justified in giving to his reader two additional figures that present superior and lateral views of the bone in that bird; in comparing it with other figures given one cannot avoid being struck with these marked departures from the common type. There is one other Grouse that affects this style of pelvis, and that is *Pediœcetes*, and the attempt is not a bad one. The principal points wherein the Sharp-tailed Grouse has failed to make a perfect imitation of the unique pelvis of his ideal are, the ilia have failed to produce such ponderous overhanging lateral flaps, that nearly shut out from view the ischiadic foramen on either side. Again, these bones in *Pediœcetes* meet the sacral vertebræ for their entire length internally; and in this bird, too, the pubic elements often unite all along the inferior borders of the ischia. This does not occur in the Pinnated Grouse; otherwise the bones are very similar and marked exceptions to the general pattern of the other members of this subfamily.

After examining a large number of the pelves of our Grouse, and noting their capacious cavities and great width from side to side, one cannot help but be surprised at the great change in outline, on turning to these bones as they are found among the Partridges.

As a rule in these birds, the pelvis is elongated and unusually narrow, though the drooping ischia behind give it additional depth in its more posterior parts; the pubic bones are turned up behind after they extend beyond the elements above them, and the lateral walls formed by the ilia are, just beyond the acetabula, almost vertical; in fact, one would almost suspect the pelvis of the common Virginia Partridge as belonging to the skeleton of some variety of Curlew, had he not been sure of the owner. This apparent departure from the more general model of this bone in Gallinaceous Fowls, however, is not nearly so decided in other varieties of the *Odontophorinæ*, as for instance in *Lophortyx californicus*, and a very good drawing of the pelvis of this bird can be seen and studied, in Mr. T. C. Eyton's Osteologia Avium, London, 1867, Plate 22, figs. 1, 1, 1, 1; three of the figures here cited, however, are for the palatine bones, inferior view of sternum, and anterior and posterior views of the tarso-metatarsus. We have carefully compared the diameters of these representations with the skeletons of the species in question, and find them quite accurate.

The *femur* in the young chick of *Centrocercus* is less than demi-developed; above, the head is almost entirely cartilage, while below the condyles are very indistinct and the bone bears no signs of pneumaticity. In a few weeks, however, these points rapidly exhibit themselves: a rounded trochanterian ridge is thrown out; the head essays to assume its sphericity; the condyles become evident; the fibular groove appearing last of all and about the same time with the vascular foramen or medullary orifice at junction of upper and middle thirds. Regarding this bone in a fine old ♂ from *Cupidonia*, and comparing it with others, we find that it is remarkably well balanced in point of length and general development.

The trochanterian ridge is markedly prominent and arches over the articular facet for the ilium; the neck is distinct and makes an angle of 45° with the shaft; the head is well formed, spherical, and in all Grouse seems to bear a double depression for the ligamentum teres. Anteriorly below the trochanterian eminence there is an extensive collection of pneumatic foramina. The "trochanter minor" never develops.

The shaft is smooth, bent slightly forwards; displays the usual muscular lines and the medullary orifice; it is nearly cylindrical on section about its middle, and before terminal expansion takes place. Below, the rotular channel is very evident, separating the prominent condyles; of these the external and lower one presents the usual fibular fissure; behind, the popliteal depression is well sunken, one of the muscular lines running into it, and often a foramen is found at its base. Slight fossæ are found laterally at the outer surfaces of the condylar enlargements, and sometimes a notch where shaft meets the internal one anteriorly. The bone is usually slenderer in *Bonasa*, *Pedicœcetes*, and *Tetrao canadensis*.

Among the *Odontophorinæ* the femur has the same general characteristics; it is, however, *non-pneumatic*, the double pit for the ligamentum teres is better marked, and the muscular lines are scarcely perceptible.

The *patella* is never absent in the *Tetraonidæ*, and occupies its usual position as a free bonelet protecting the anterior aspect of the knee-joint. It accommodates itself to the conformation of the rotular channel, having a flattened surface superiorly, a rounded border below, and a double surface behind, the most extensive aspect of which is applied to the side towards the internal condyle.

The proximal extremity of *tibia* in the young chick of *Centrocercus* has advanced so little toward assuming any of the definite characteristics of the full-grown bird, that, almost in self-defense, we take up for examination the bone from a skeleton of a bird of the same species several weeks older; here we discover the superior general condylar surface still capped with cartilage, and the borders confining it, as yet, but feebly produced. The most interesting point, by far, is the appearance of an unusually large epiphysis, if it may be so termed, fashioned to and resting upon the future location of the "rotular crest."

Why this bone should be here added we cannot, as far as our knowledge extends, exactly comprehend, for in the old and mature birds of any of the Grouse the epi-cnemial crest is never very prominently produced, nor is it in any of their near kin. As age advances this segment becomes thoroughly confluent with the tibia, and leaves no trace of its early existence.

The head of the bone in the adult Sage Cock is a very substantial affair, with pro-and ecto-conemial ridges, that soon merge into the shaft, well produced; the latter ridge is usually dilated on its anterior aspect, and the rather extensive concavity between them is directly continuous with the shaft below.

The tibia never becomes pneumatic either in the Grouse or Quails, and in the former sections of its shaft are universally transversely oval; the fibular ridge of the upper and outer third of this portion of the bone in *Centrocercus* is about 2 centimetres long, and appears to be little more than a raised and roughened line, the merest apology for an invitation to its delicate companion, the fibula, to ever form a lasting and inseparable bond of union with it, a contract which this free and independent little bone has never entered into, in any of the Grouse or the *Odontophorinæ*, notwithstanding the fact that they are destined to be the closest of associates their whole life through. Below the fibular ridge we find the nutrient foramen, but otherwise the tibial shaft is very straight and almost entirely devoid of any markings, at least to that point anteriorly, where the ascending groove coming from between the condyles impresses it, and that, with an increasing intensity to its termination over the intercondyloid notch; at this point a bony bridge is thrown across obliquely, the outer abutment of which is the lower (Plate IX. Fig. 69).

The most engaging points of interest so far as the tibia is concerned, (as many a young Grouse that long since has yielded up his life to the cause of ornithotomy can testify to) centre about the distal extremity of the bone. After careful examinations of the recently-killed subjects, dried skeletons, and carmine-stained specimens, the following results seem to be presented with greater or less distinctness in every case, and these results correspond very nearly with Professor Morse's invaluable investigations and studies: In the young of *Centrocercus*, several days after leaving the nest, we observe at the future site of the tibial condyles, encased in the then articular cartilage, on either side, a free reniform ossicle. These ossify to the surface in time, and the outer becomes the *fibulare*, the inner the *tibiale;* both are tarsal bones. It will take time and further research to decide definitely as to which is the os calcis, and which the astragalus. Above the former, and a little towards a mid-shaft position, there is yet another free ossicle; it is the *intermedium* of Morse. That it is another tarsal bone there can be no doubt, we believe, at this date; but before we decide upon its special homology we must satisfy ourselves by further research and dissection of the young at various stages of development in birds and other vertebrates where this bone constitutes a feature of the skeleton.

It soon fuses with the *tibiale*, and the latter with the *fibulare*, so that the faintest traces are alone discernible in the bird at two months of age (Plate IX, Fig. 67, E′), at which stage the subsequent bony span for tendinous confinement above them has not commenced to ossify.

In the adult the apex of the *intermedium* affords attachment to the oblique ligament that is attached higher up on the inner aspect of the shaft, that also holds some of the extensor tendons in position. The condyles in mature birds have an antero-posterior position at the extremity of the tibia; these are of a uniform outline, and the inter-condyloid notch that separates them can boast of no particular depth until it arrives on the anterior aspect of the bone. Externally and laterally almost within the limits of the outline of the outer condyle we find two tubercles, one above another; the lower is for ligamentous attachment, the upper is the remnant and only existing evidence of the lower extremity of the fibula. A similar tubercle is found on the opposite side corresponding to the lower one just described on the outer aspect.

The *fibula* is freely detached and never completely anchyloses with the tibia. Its proximal extremity is clubbed, enlarging very much as it rises above the condylar surface of its companion from the fibular ridge; it is laterally compressed and convex above at the summit. In many Grouse the attenuated remains of its extension below can be traced on the shaft of the tibia, which bone has nearly absorbed this third of its weaker associate.

In my papers upon the osteology of *Speotyto* and *Eremophila* the old term of the "calcaneal" process was still retained for that prominent projection found at the superior and hinder end of the bone *tarso-metatarsus.* The older comparative anatomists gave it this name, probably, in view of the fact that this apophysis might eventually be proved to be the os calcis, but such advances have been instituted in the study of the avian tarsus, that we may say that this process is not in any way entitled to the term; it does not even come in contact with the primoidal element of that tarsal segment, so this appellation will here be abandoned, and as far as we are concerned such an error will receive no further encouragement in the way of ornithotomical recordation.

In the early life of the chick of the Grouse we have been discussing, the combined tarsals are surmounted by a third plate of cartilage, that subsequently ossifies, apparently by one centre. The bone thus formed, the *centrale*, we believe undoubtedly to represent either a single tarsal element or the connate bones of the second row.

At this age the metatarsals that combine to form the shaft of the tarso-metatarsus are still easily individualized, though well on the road toward permanent fusion. It will be observed that we still retain the term *tarso-metatarsus*, and we think justly so, as the compound bone of the mature bird has combined with it at least one of the tarsal bones. The tibia could with equal reason be termed the *tibio-tarsus*, and again the compound bone in manus, the *carpo-metacarpus*, but for obvious reasons such innovations are not always advisable.

We discover in *Centrocercus* and *Tetrao canadensis*—in that strong inelastic cartilage that is found at the back of the tarsal joint in all the Grouse, on the inner side—a concavo-convex free bone, nearly a centimetre long, in the Sage Cock, and two or three millimetres wide; this ossicle must be regarded only as a sesamoid, though it is nearly as large as the patella, and in no way as constituting one of the tarsal bones.

The posterior process, or the *tendinous process* (the "calcaneal" of the older authors), at the head of the combined metatarsals, is both vertically grooved and perforated for the passage of tendons; from its inner and posterior angle in many of the *Tetraoninæ* it sends down a thin plate of bone that usually meets the shaft at junction of upper and middle thirds, occasionally running further down to become confluent with it in every instance; this feature is rarely present in the Quails. In *Centrocercus* and others the hinder aspect of the tarso-metatarsus is sharply marked by muscular ridges. The superior and articulating surface of this bone displays eminences and depressions fashioned to accommodate themselves to the condyles of the tibia; a tuberosity on the anterior margin in the articulated skeleton fits into the intercondyloid notch of the bone. Below this the shaft in front is scooped out, having at the base of the depression two small elliptical foramina, side by side, and to the inner side of its boundaries one or two pointed muscular tubercles. The distal and transversely expanded end of the bone presents the foramen for the anterior tibial artery, occupying its usual place, and the three trochlear apophyses for the toes, the middle one being the largest and on the lowest level. The two lateral ones, separated by wide notches from the former, are thrown but a limited distance to the rear, so that the concavity behind them is not peculiar for any great amount of depth.

The *os metatarsale accessorium* is situated rather high upon the shaft, and bears more than an ordinary semblance to a demi-phalanx, with its distal articular trochlea. As usual it is freely attached by ligaments.

The *internodes* are based upon the more common plan as applied to the avian foot; *i. e.*, in the order of the phalanges, from the first to the fourth, 2, 3, 4, 5 joints, and of such a pattern they are markedly typical, and justly equipoised for the size of the bird.

They possess the usual enlarged and bi-concave proximal extremities, with the distal and convex bi-trochlear ends, with a more or less subcylindrical shaft; the ungual joints being but moderately curved downwards.

There are but few or no striking differences to be noted as existing among the lower extremities of our *Tetraonidæ.*

The bones are very delicately fashioned in *Tetrao canadensis* and the Sharp-tailed Grouse; that is, the calibres of their shafts seem to be less as compared with their general lengths, but they belong, we must remember, to very trim little game birds, as contrasted with our heavy and ponderous old Sage Grouse of the western prairies. Our specimens of *Lagopus* and *Tetrao obscurus* do not show the bony extension from the *tendinous process* at the back of the *tarso-metatarsus*, apparently present in all the others and alluded to above—*Centrocercus* sometimes proving an exception—and this bone never normally develops a spur in any of our North American Grouse, as seen in birds of near kin.

Tendons of the anti-brachium and pinion are very prone to ossify, and one is quite constant on the anterior aspect of the metacarpus. This applies with still greater force to the lower limb, where it seems that every tendinous extension of the muscles of thigh and leg become bone for their entire lengths, then forking sometimes over the fore part of tarso-metatarsus as they branch to be distributed to the podium.

It may be found that *Bonasa* can claim normally six segments as representing the caudal vertebræ, and we have in our possession a pelvis of this bird where a rudimentary second sacral rib is evident, but this can only be regarded in the light of an anomaly.

Interesting osseous malformations are occasionally to be seen, but they are beyond the jurisdiction of this monograph to treat; nor will it be practicable to enter into the engaging subject of the differences between the pelves in the male and female birds, but that such differences do exist there can be no reasonable doubt.

Did classification depend entirely upon *external* topography, appearance, and structure, the author would say that the *North American Tetraoninæ* as they now stand are well classified; but strip them of these characteristics, or, rather, permit them only to hold the subordinate place, allow specific habits to have no weight, and then from an osteological point of view, purely, we can perceive no good reason why *Pediœcetes* and *Cupidonia* should not be thrown into one and the same genus. As far as their skeletal framework is concerned they are singularly alike, and strikingly dissimilar from all the other genera; but as such changes will only be *generally* suggested and tolerated as our knowledge of ornithotomy increases, it must of necessity remain to be seen how the anatomy of the other systems of these two birds will support such a generic reduction.

FORT FETTERMAN, WYO., *May* 1, 1881.

EXPLANATION OF PLATES.

PLATE V.

FIG. 47.—Cranium of young *Centrocercus*, three or four days old, viewed from above.

FIG. 48.—The same; lateral view, with lower jaw added, showing articular element detached.

FIG. 49.—The same, viewed from below.

FIG. 50.—*Centrocercus*. Lateral view of skull of "bird of the year" four months old; the hyoid arch has been detached.

FIG. 51.—The same aged bird as in Fig. 50, showing the disarticulated segments of the four cranial vertebræ: OV, neural arch of the occipital vertebra (epencephalic arch), first of the skull; OV′, its hæmal arch in outline (scapular arch); *so*, superoccipital; *eo*, exoccipital; *po*, the connate paroccipital; *bo*, basi-occipital; PV, neural arch of the parietal vertebra (mesencephalic arch), second of the skull; P. V.′, its hæmal arch (the hyoidean); P, the parietal; *ms*, the mastoid; *as*, the alisphenoid; *bs*, the basi-sphenoid; *gh*, the glossohyal; *ch*, the ceratohyal; *bh*, the basi-hyal; *uh*, the urohyal; *hb* and *cb*, the hypo-branchial and cerato-branchial elements of the thyro-hyals, respectively; F. V., neural arch of the frontal vertebra (proencephalic arch), third of the skull; F.V.′, its hæmal arch (the mandibular); Fr, the frontal; *x*, the site of the postfrontal in some of the class; *os*, the orbito-sphenoid in outline; *ps*, the basi-presphenoid; Tp, the tympanic; *ar*, the articular; *S. an*, the surangular; *an*, the angular; *se*, the splenial element; and *de*, the dentary element; N. V., the neural arch of the nasal vertebra (rhinencephalic arch), the fourth and last in the skull; N. V.′, its hæmal 'the maxillary); N, the nasal; *Pf*, the prefrontal (ethmoid); *Vr*, vomer in outline, as it does not occur in this bird; *Pl*, palatine; *mx*, maxillary; *i. mx*, intermaxillary (or premaxillary); 1, the petrosal; 2, the sclerotals; 3, the lacrymal; *Pty*, the pterygoid, the diverging appendage of *Pl*, the palatine; *sq* and *ma*, the *squamosal* and *malar*, respectively, are diverging appendages of *Tp*, the tympanic.

PLATE VI.

Fig. 52.—Lateral view of skull of *Centrocercus*, adult ♂, hyoid arch removed. Figs. 54, 55, 58, 61, 64, 65, 66, 68, 69, and 70 are from the skeleton of the same specimen.

Fig. 53.—Sternum of the chick, three or four days old; *Centrocercus*.

Fig. 54.—Sternum of *Centrocercus*, viewed from below; adult ♂.

Fig. 55.—Dorsal vertebræ, lateral view, left side, from the same.

Fig. 56.—Sternum of *Centrocercus*, "bird of the year" (two months old), showing development of this bone: 4, *lophosteon*; 5, *metosteon*; 6, *pleurosteon*.

PLATE VII.

Fig. 57.—Right pectoral limb of *Centrocercus*, same bird as the sternum in Fig. 56 was taken from. H, humerus, palmar aspect; *r*, radius; *u*, ulna; *s*, scaphoid (radiale); *c*, cuneiform (ulnare); *z*, unciform; *d*, index digit; 9, third metacarpal (annularis); 9′, second metacarpal (medius); *d′*, *d′′*, phalanges of the second metacarpal; *d′′′*, phalanx of the third metacarpal.

Fig. 58.—Left metacarpus of an adult *Centrocercus*.

Fig. 59.—Left metacarpus of the same bird as figured in 57, showing all the segments that go to make up the bone in Fig. 58: *om*, carpale or os magnum; z, unciform; 7, index or first metacarpal; 8, pisiform; 9′, second metacarpal; 9, third metacarpal (annularis).

Fig. 60.—Left humerus (*Centrocercus*), taken from the same bird as in Fig. 57.

Fig. 61.—Left humerus, anconal aspect, *Centrocercus*; adult.

Fig. 62.—Ossa innominata, *Centrocercus*, three or four days old, showing how the pelvic bones form the acetabulum: *X*, ilium; *Y*, ischium; *Z*, os pubis.

Fig. 63.—Pelvis, same bird as in Fig. 57; *Centrocercus*; X, ilium; Y, ischium; Z, os pubis.

Fig. 64.—The perfect pelvis, lateral view, as in 62 and 63, of *Centrocercus*; adult ♂.

PLATE IX.

Fig. 65.—Posterior view of pygostyle, adult *Centrocercus*.

Fig. 66.—The same, left lateral view.

Fig. 67.—Pelvic limb, anterior view, *Centrocercus*, taken from same bird as in Fig. 57: *E*, *Epicnemial epiphysis* of the tibia; *E′*, the confluent tarsal bones found at the distal extremity of the tibia at this age, *tibiale* (astragalus), and *fibulare* (os calcis); *E′′*, *the centrale*.

Fig. 68.—Left *tarso-metatarsus*, inside view, adult ♂, *Centrocercus*.

Fig. 69.—Anterior view of right tibia and fibula, from the same skeleton as 68.

Fig. 70.—Anterior view of right femur, same bird as shown in Figs. 68, 69.

PLATE X.

Fig. 71.—Right lateral view of skull of adult ♂ *Cupidonia cupido*.

Fig. 72.—Lower mandible from the same, viewed from above.

Fig. 73.—Skull from the same, lower jaw removed; seen from above.

Fig. 74.—The same from below.

Fig. 75.—Sclerotals, right eye from the same.

Fig. 76.—Right humerus, from the same, palmar aspect.

Fig. 77.—The same, anconal aspect.

PLATE XI.

FIG. 78.—Sacral vertebral rib with its hæmapophysis, left side; *w'*, the pleurapophysis, posterior view; *w*, the corresponding hæmapophysis.

FIG. 79.—Fifth pleurapophysis with its corresponding hæmapophysis attached; from the same bird, dorsal vertebræ, inside view.

FIG. 80.—Fourth pleurapophysis with its corresponding hæmapophysis attached; from the same bird, (*Cupidonia*), dorsal vertebræ, outside view.

FIG. 81.—Sternum from below; same bird.

FIG. 82.—Sternum, left lateral view; same bird (*Cupidonia cupido*).

PLATE XII.

FIG. 83.—Pelvis from above; same bird.

FIG. 84.—Pelvis, right lateral aspect; same bird.

FIG. 85.—Right scapula and coracoid, *in situ;* same bird.

FIG. 86.—Left coracoid, posterior view, from the scapular arch of the same bird.

FIG. 87.—Right lateral view of clavicles, from the scapular arch of the same bird; dotted lines show the outline viewing it from behind.

PLATE XIII.

FIG. 88.—Right lateral view of skull of adult ♂ *Lagopus leucurus;* hyoid arch has been removed.

Fig. 89.—Cranium of *Pediœcetes phasianellus;* lacrymal, nasal and intermaxillary still attached.

FIG. 90.—Pelvis, adult ♂ *Tetrao canadensis*, viewed from above.

FIG. 91.—Portion of skeleton of Ptarmigan, *Lagopus leucurus*, showing thoracic and pelvic bones *in situ*, with the scapular arch and caudal vertebræ. The last cervical vertebra still remains attached in order to show its free pleurapophysis.

PLATE V

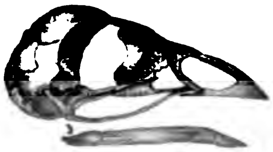

Fig 48

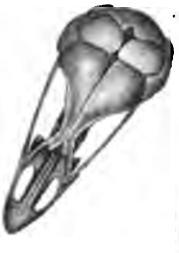

Fig 47

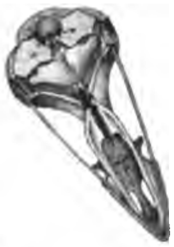

Fig 49

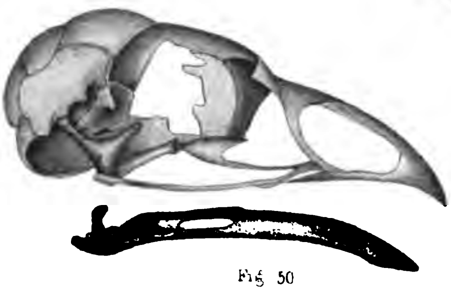

Fig 50

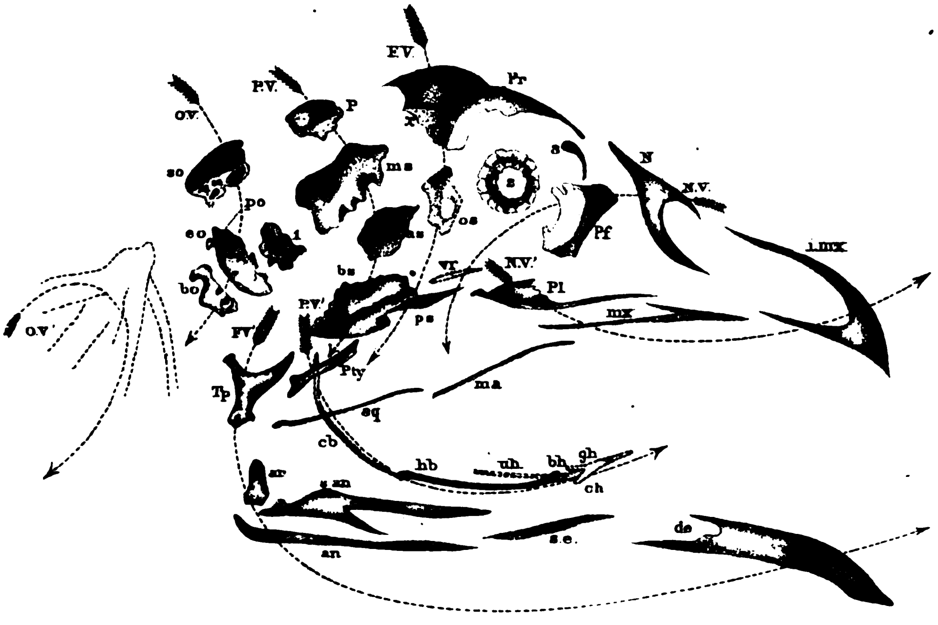

Fig 51

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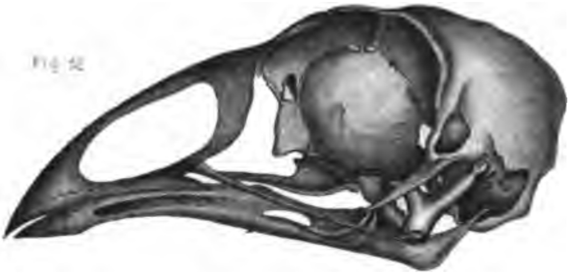
Fig 52.



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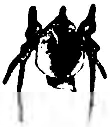
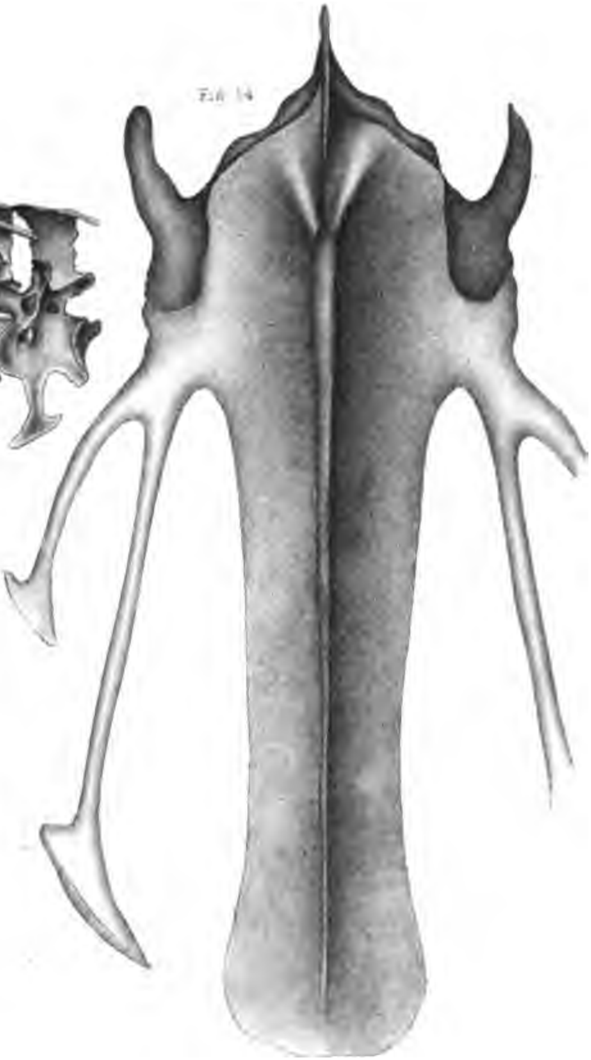


Fig 54.



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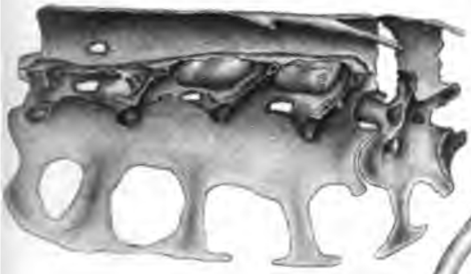

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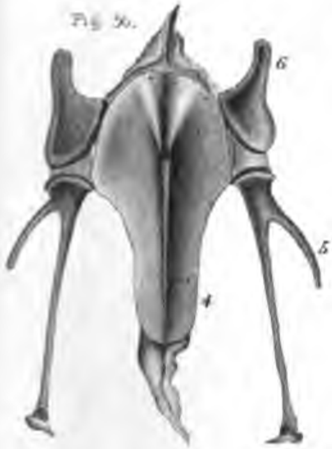

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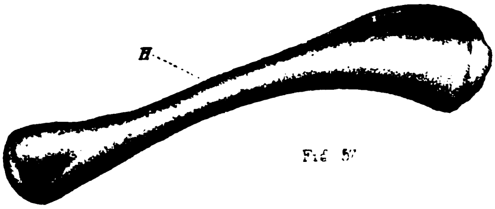
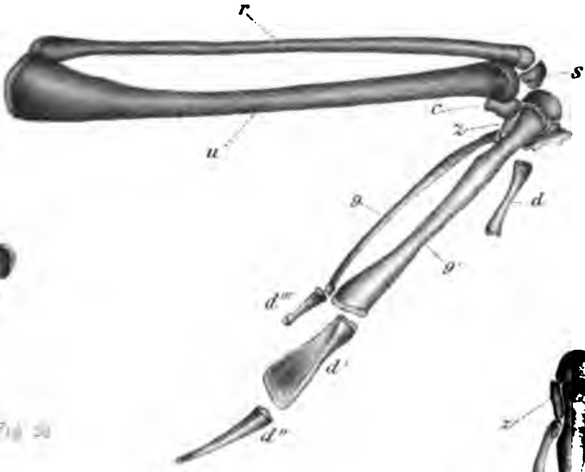


Fig 57



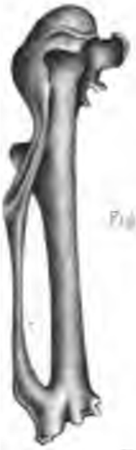


Fig 58

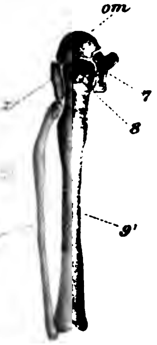


Fig 59

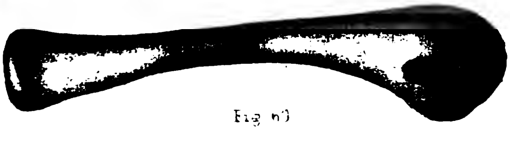


Fig 60

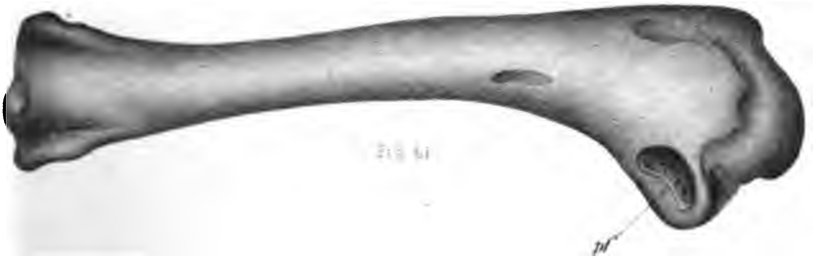


Fig 61

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PLATE VII

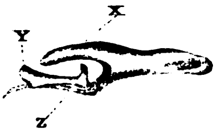

Fig. 62

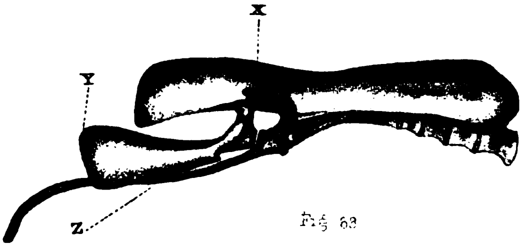

Fig. 63

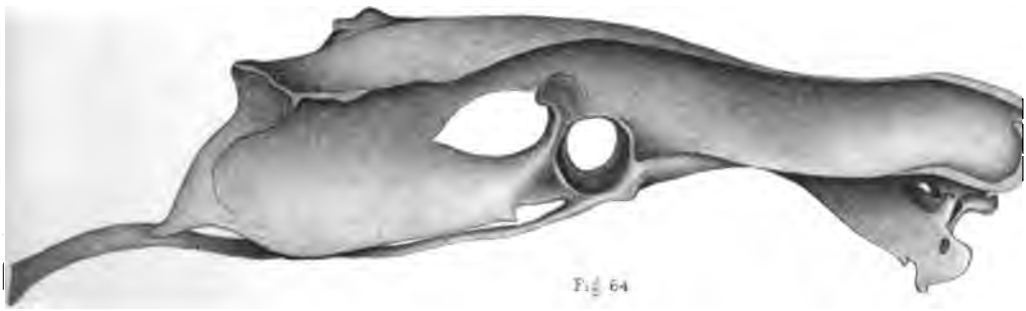

Fig. 64

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PLATE IX

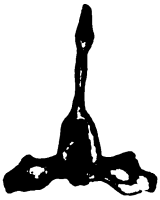

Fig 65

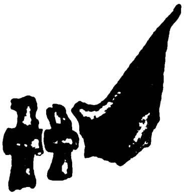

Fig 66

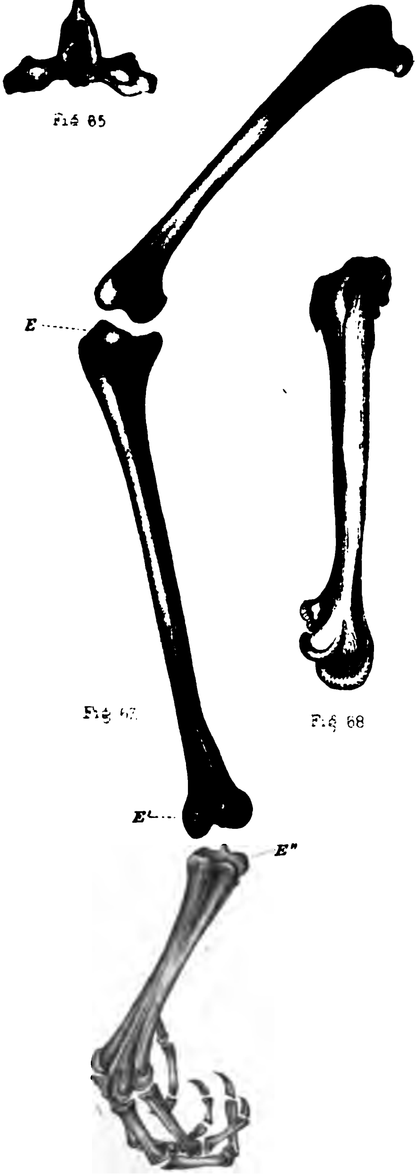

Fig 67

Fig 68

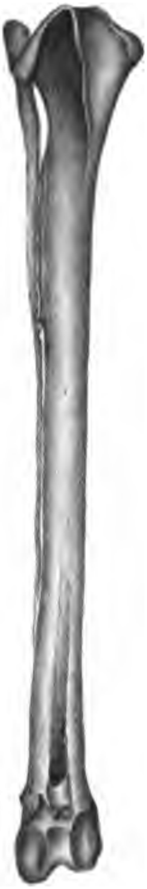

Fig 69

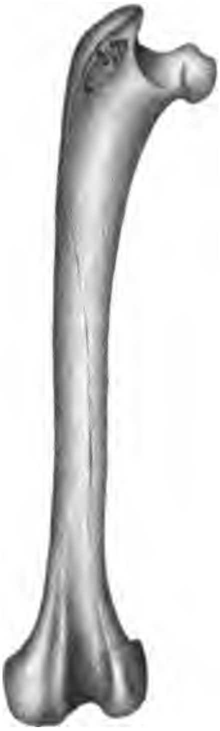

Fig 70

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PLATE X.

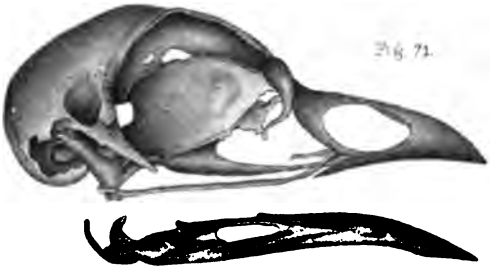


Fig. 71.

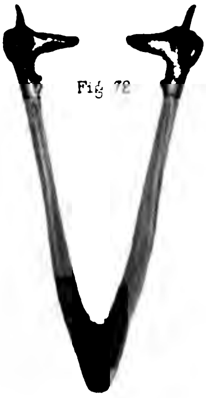


Fig. 72.

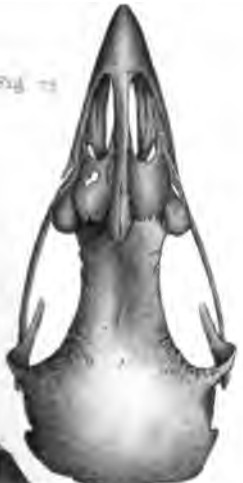


Fig. 73.

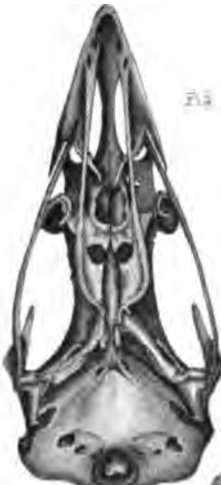
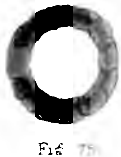


Fig. 74.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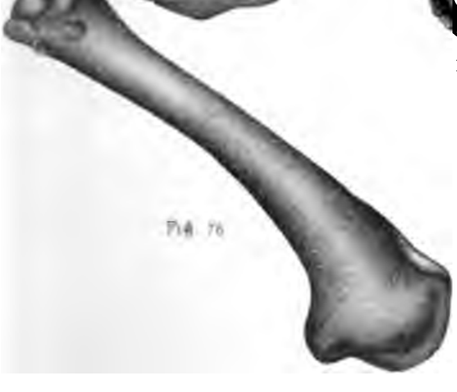


Fig. 76.

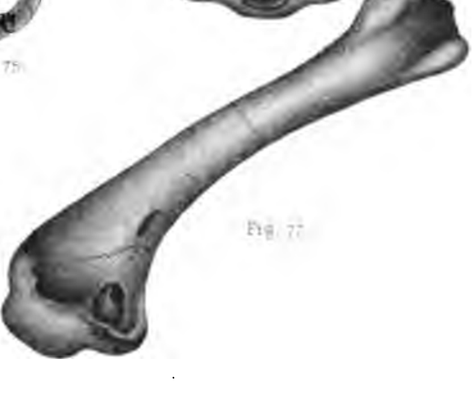


Fig. 77.

T. Sinclair & Son Lith.

SHUFELDT ON THE OSTEOLOGY OF AMERICAN TETRAONIDÆ.

PLATE XI

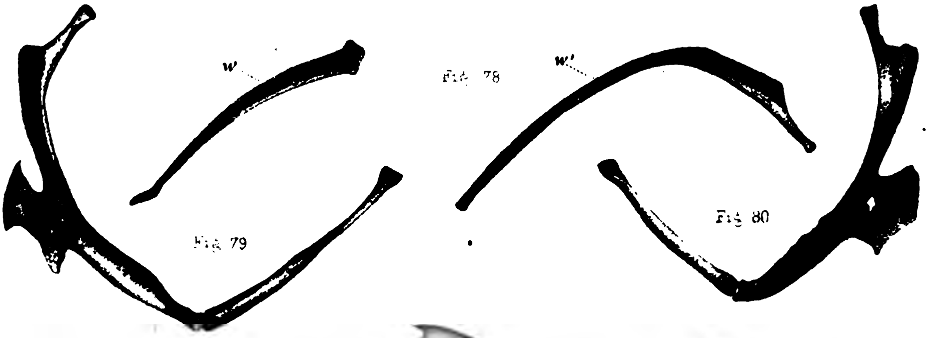


Fig. 78

Fig. 79

Fig. 80

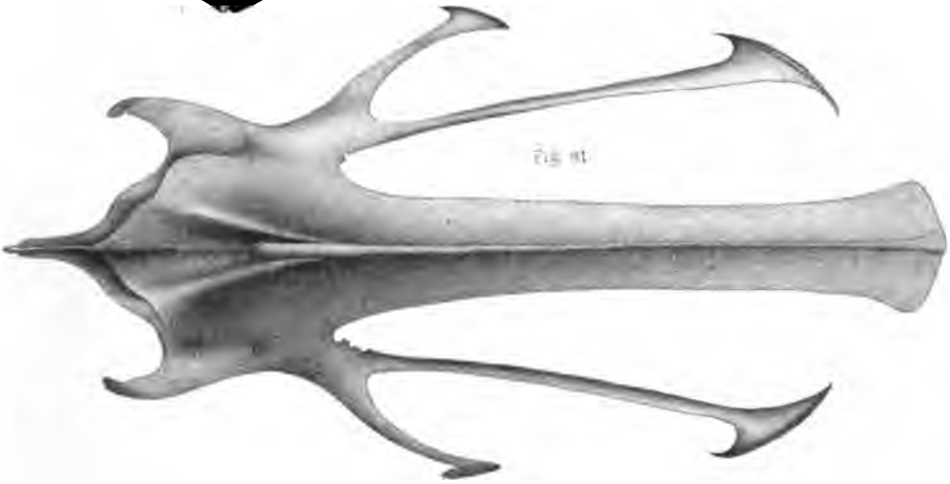


Fig. 81

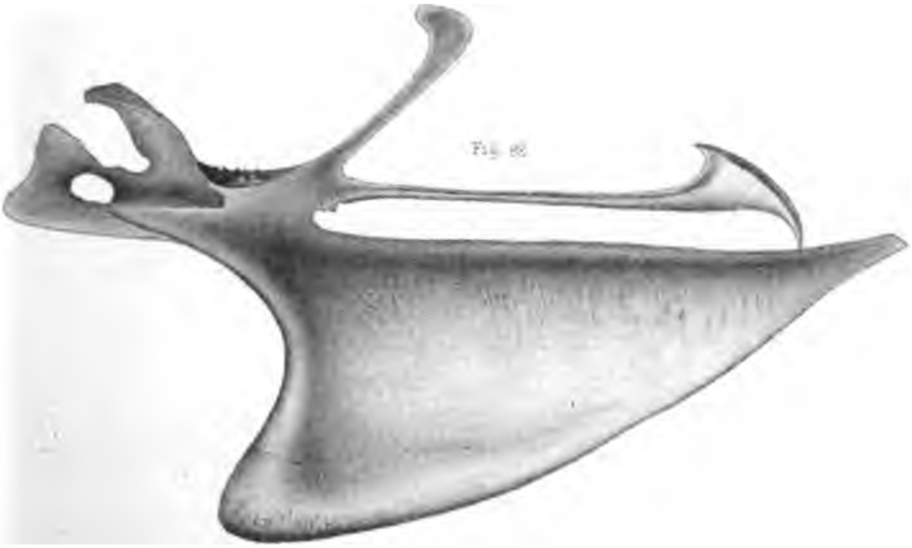


Fig. 82

T. Sinclair & Son, Lith.

SHUFELDT ON THE OSTEOLOGY OF AMERICAN TETRAONIDÆ.

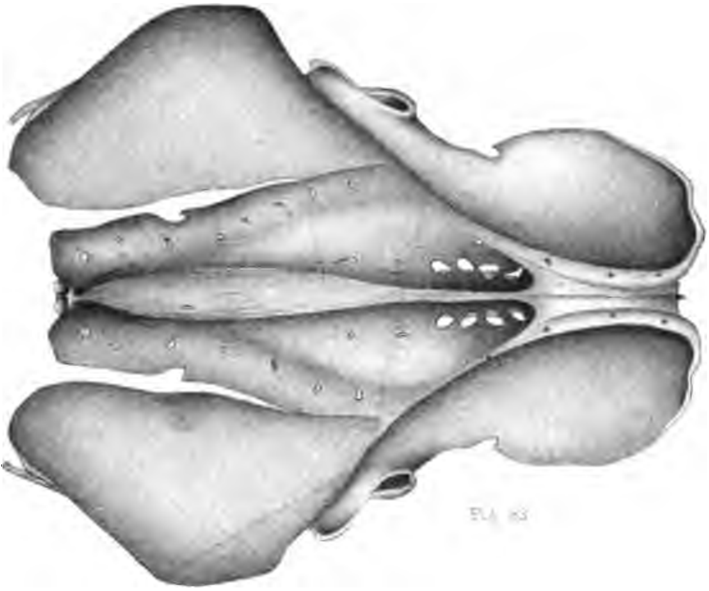


Fig. 83

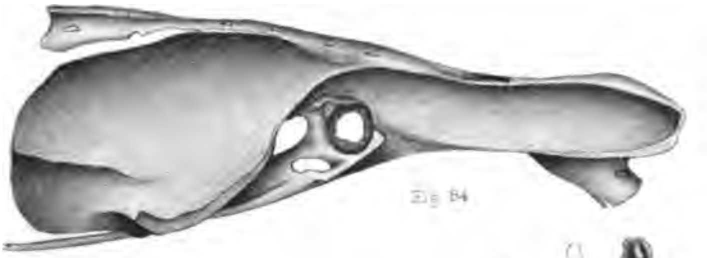


Fig. 84

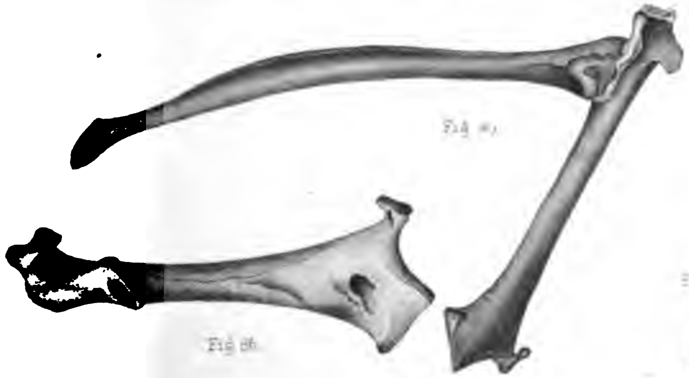


Fig. 85

Fig. 86

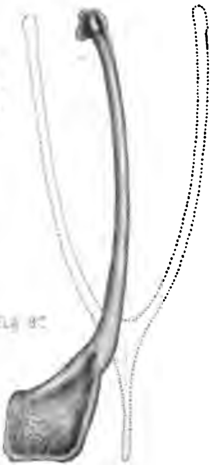


Fig. 87

T. Sinclair & S

SHUFELDT ON THE OSTEOLOGY OF AMERICAN TETRAONIDÆ.

PLATE XIII

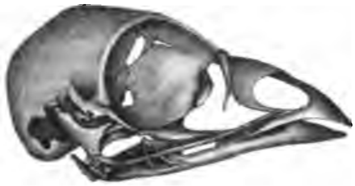


Fig 88

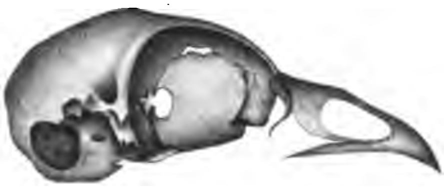


Fig 89

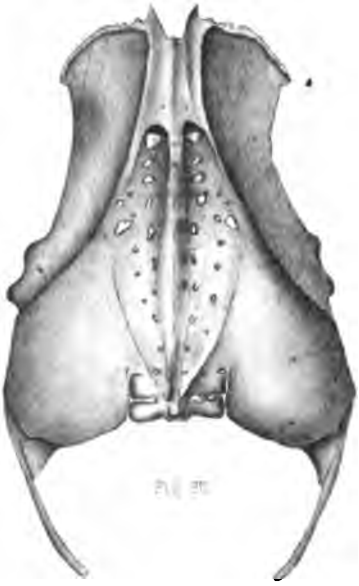


Fig 90

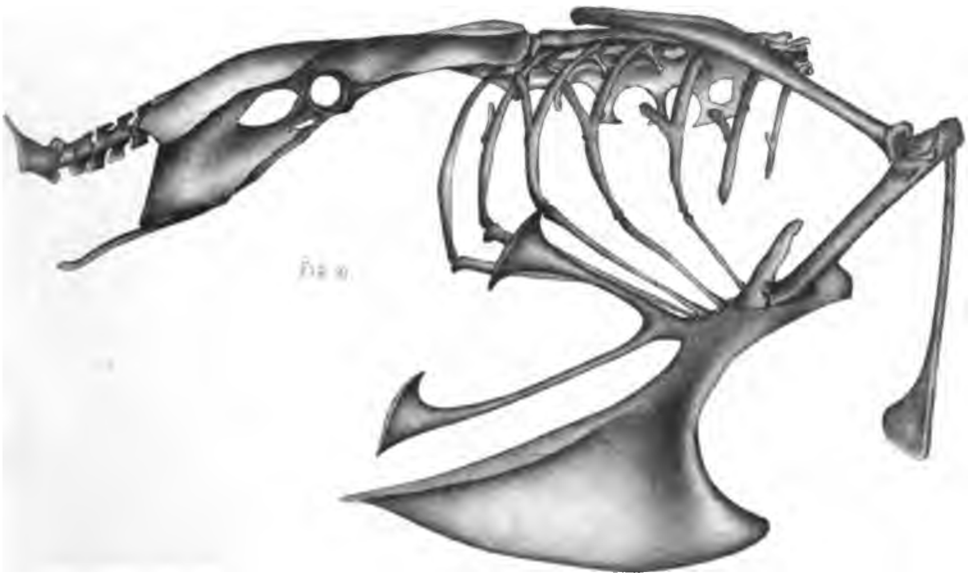


Fig 91

T. Sinclair & Son, Lith.

SHUFELDT ON THE OSTEOLOGY OF AMERICAN TETRAONIDÆ.

Art. XIV.—Osteology of Lanius ludovicianus excubitorides.

By R. W. Shufeldt, M. D., First Lieut. Med. Dept. U. S. Army.

Mr. Robert Ridgway, in his carefully prepared check-list of North American Birds (Bull. No. 21, Nomenclature of N. American Birds, chiefly contained in the U. S. Nat. Mus., Washington, D. C.), gives us the representatives of *Laniidæ*, the species *borealis* and *ludovicianus*, with the two occidental varieties of the last, *robustus* and *excubitorides*, which latter form we have chosen as the subject of this paper to demonstrate the peculiarities of the skeleton of these interesting birds. The habits of the Shrikes are well known to all ornithologists, so one will not be surprised, after a view of Fig. 100, in the plate (where our subject has been made, by the aid of the dissecting knife and maceration, to exhibit one of the truest indices of his character), to find the large, semi-hawk-like skull surmounting the remainder of a bony frame-work, that might easily be mistaken as belonging to a Thrush or any other Oscine; but it is this very characteristic that individualizes these truly passerine-raptorial birds.

In the skull, divested of the lower jaw and hyoid arch in the adult, we find that anchylosis of the primoidal segments has been very thorough; outside of the bony parts of the sense capsules—the tympanic elements and the pterygoids are the sole escapers of this notorious feature in avian craniology—indeed, we discover in the skull of this species, before it has left the nest, that the primitive segments of the occipital vertebra are well advanced towards permanent union, especially about the condyle, traces of its formation being extremely difficult of discernment, and in the mature bird this hemispherical facet for the atlas is exceedingly diminutive, measuring only .5 of a millimeter in diameter. About the basi-cranii we find the usual foramina for the exit and entrance of vessels and nerves, and note in our examination that the anterior apertures of the Eustachian tubes are double, very small, and protected by an osseous lip from the basi-sphenoid. The foramen magnum is sub-circular and of medium size; together with the basi-cranii, it makes an angle with the horizontal plane of 25°, the anterior bearing point being the tip of the beak, and the two posterior bearing points being the internal facettes upon the tympanics. That part of the cranium above, formed by the frontals and parietals is very broad and smooth, and quite often the sutural traces are easily made out, and in cases where maceration is persisted in, the coronal suture may gape—beyond, the interorbital region becomes slightly depressed. The pseudo fronto-maxillary articulation is denoted by a transverse line nearly a centimeter long, and is moderately flexible; the superior tips of the lacrymals form its lateral boundaries. The superior mandible is made up of the usual bones, it is very broad at its base, and gently deflected throughout; the nasal bones bound posteriorly on either side vacuities that lead into the rhinal chambers, but the true nostrils are found beyond these, as distinct elliptical apertures. It is, however, the horny integumental sheath that really gives to this bird's beak its peculiar raptorial aspect, for when stripped of this, the osseous tomia show no sign of notch or tooth beyond. Below, the palatine fissure is quite wide, and through its opening we discover that the ethmo-turbinals are more or less developed, together with a partial septum narium, and the space is further intruded upon by a sub-compressed and originally distinct vomer, that is bifurcated behind to receive the rostrum of the basi-pre-sphenoid, lodging a portion of the prefrontal in its fissure above.

The palatines have become amalgamated with the inter-maxillary anteriorly, and form, with the pterygoids, the usual joint on the rostrum of the sphenoid behind; they throw out sharp lateral apophyses that are directed backwards. The pterygoids are very much expanded at their mesial ends, their shafts being straight and delicate; and there are no pleurapophysial processes; they meet the tympanics in subcircular heads, of no great size, just below the orbital processes. These latter elements possess very broad and twisted mastoid prolongations, with the usual double facet and intervening depression below; and the orbital apophyses are pointed at their extremities, sometimes slightly clubbed, being turned gently upwards. The segments composing the infraorbital bar have long since become one single bone, a slender style fulfilling its ordinary functions. A sub-elliptical sesamoid is found at its proximal end, between it and the tympanic. The orbital cavities are capacious, and well divided from the rhinal chambers by the broad, quadrate lacrymals on either side; their vaults are concavely arched, and their posterior walls quite extensive, looking almost directly forwards. The foramen for the exit of the first pair from the brain-case has run into one irregular aperture; but rarely joins, in the adult, with the elliptical foramina for the optic nerves below them. The orbital septum is never complete, a vacuity of greater or less extent occurring near the center of the plate. Laterally we observe shallow temporal fossæ above elongated openings to the otocrane, that look downwards, forwards, and outwards, standing out quite prominently from the side of the skull. The mastoids throw forwards and downwards horizontally flattened apophyses, which, by the aid of smaller ones from the alisphenoids, help it to guide the temporal muscles to their points of insertion. A moderately marked "cerebellar prominence" is found at its usual site, above the foramen magnum behind; but we have never observed the foramina, caused by bone thinning, to occur on either side of it. In removing the cranial vault, we find the various fossæ unusually well defined, and bounded by sharp borders; the carotids enter by separate openings at the base of the "sella turcica," which latter has a deep notch, mesiad, in its posterior wall.

In the recent cranium, the internal and external tables are separated by an interspace of a millimeter or more, that is sparsely filled in by diploic tissue; but upon examining skulls that have been kept for a long time, and consequently become thoroughly dried, we cannot distinguish between the two tablets; the diploic tissue has entirely disappeared, and the whole roof is extremely attenuated and *flexible*. We are not prepared to explain how this remarkable change comes about.

The *hyoid arch* bears out its usual ornithic and oscine characteristics, and does not require any special description here, as the author intends to furnish a more elaborate description of the skull when he comes to touch upon the *Vireonidæ;* a faithful outline of this arch is given, however, from a superior view in Fig. 101 of the plate.

Before the young of this Shrike has left the nest the numerous elements of the lower jaw have become fused together, so that during maceration the two rami rarely separate at any other point except the symphysis between the dentary elements. In the old bird it is a stout and strong bone, with sharp-pointed extremity beyond, and deeply scooped-out articular ends posteriorly, with blunted processes behind, and up-turned ones looking towards each other, mesiad. Externally the "sides of the jaw" are concave for their posterior two-thirds, and exhibit the usual elliptic foramen (Fig. 102); while the superior ramal borders are rounded and rise into slight prominences at the junction of the outer and middle thirds. As to the sense capsules, we find that the sclerotals are well developed, and very accurately matched together; the usual ossicles of the organ of hearing likewise ossify.

There are thirteen vertebræ devoted to the cervical portion of the spine, and, although they make a faint attempt towards a raptorial appearance, they are more oscine in their character than anything else, and are not noted for the prominence of any of their outstanding processes; disregarding the atlas, the first four bear neural spines, this feature not showing itself again until we find it in the last two, the thirteenth possessing it as well developed as any of the dorsals. The post- and prezygapophyses are markedly short, thus bringing all the segments quite near together, giving considerable stability to this division of the column. The parapophyses are very delicate where they are produced anteriorly at mid-neck, and quite inconspicuous above; the first four and the last six vertebræ bear hypapophyses, they being three-pronged on the last two; this limits the carotid canal to the fifth, sixth, and seventh cervicals, unusually slight protection for this important arterial branch. The vertebral canal commences in the tenth—*i. e.*, in this segment it is completely surrounded by bone, and continues its course through the axis; the last two or three vertebræ are very broad from side to side, the ultimate one bearing a free pair of pleurapophyses that have in their turn distinct uncinate processes.

The neural tube as found in this section of the spine commences and terminates broadly and transversely elliptical, merging into the subcircular as it nears its mid-portion at the middle of the neck; it is of considerable caliber throughout. The dorsal division of the spine has allotted to it five vertebræ, closely locked together, yet easily detached by ordinary maceration; their combined neural spines form one continuous quadrate crest. These are fastened together above by the "arrow-head" point that we have described in other papers. There is very little difference in the lengths of the transverse processes, from first to last, so we do not find much change in the processes of the ribs they sustain, as to length of pedicles and tubercula. Short metapophysial ridges are found above the diapophyses; they never seem to attain sufficient length to connect the vertebral segments, however.

The neural canal commences transversely elliptical, to terminate, much diminished in caliber, in the subcircular form. In the first dorsal we find a thin quadrate lamina of bone, projecting downwards and forwards in the mesial plane, as a well-developed hypapophysis; the second supports the merest apology for this process, and the remaining dorsals have none at all, though by compression of the centra a low ridge presents itself along their middles, which is only faintly perceptible in the last. There is a free pair of ribs for each dorsal vertebra, and these are movably connected with the sternum by corresponding pairs of hæmapophyses, the whole structure and appearance being distinctly oscine in character. The pleurapophyses are very slender below and not markedly expanded above as they are in some other birds. Commencing with the last cervical rib, and continuing entirely through the dorsals, we find the series of epi-pleural appendages complete on either side, and freely articulated with the posterior borders of the ribs, with which they make an angle of about 45°, and attain sufficient length to overlap the rib in their immediate rear, though often in younger birds, and even some old ones, the last uncinate process does not reach the free sacral rib. The sternal ribs are quite delicately fashioned, and support, as usual, anteriorly the transverse heads for articulation with the costal border of the sternum, while posteriorly we discern the moderately upturned and clubbed extremities with shallow facettes for the inferior ends of the vertebral ribs.

The *sternum* of the Loggerhead Shrike is almost or quite typically "cantorial" in its outlines, but only feebly pre-eminent in those features that stamp it as belonging to a bird of any great power of flight. The manubrium, directed upwards and forwards, springs from a solid base to become bifurcate at its anterior extremity and throw down a sharp border below, that becomes continuous with the carinal margin in front; the coracoidal grooves pass round laterally well beneath the costal processes, and merge into each other, mesiad, their point of meeting being denoted by an elliptical depression, at the base of which we occasionally find a single pneumatic foramen. The costal processes rear themselves upwards, forwards, and outwards, being broad but thin laminæ of bone, impressed upon their posterior margins by the five transverse facettes for the sternal ribs. The "body" is concave above, sloping to a shallow, osseous gutter, lying in the mesial plane directly over the keel; beyond, in this groove we observe a few scattered foramina for the admission of air to the more solid structures of this confluent hæmal spine. Behind, the bone is one-notched on either side, cutting out lateral processes with expanded posterior ends and a broad mid-xiphoidal portion—the direct continuation of the sternal body—(Fig. 92). The "carina" below averages about 7 millimeters at its deepest part; anteriorly it protudes as a rounded carinal angle, from which point its inferior boundary sweeps backwards by a gentle convex curve to terminate in a diminutive triangular space at the middle of the xiphoidal process beneath.

The sides of the keel present for examination well-defined subcostal, pectoral, and carinal ridges; the latter falls on either side from the base of the manubrial process to near the carinal angle, just within the border, and sometimes has a thickened backward branch starting from its lower end. The confluent pelvis, in common with the majority of passerine birds, has that strikingly angular outline, due largely to sharpened borders and outstanding spiny processes. There are ten vertebræ in its "sacrum," all unusually firmly fused together, vacuities only occasionly occurring among the diapophyses of the ultimate few, three or four at most. The pre-acetabular region of the ilia on either side is deeply concave, this concavity being carried up over the anti-trochanters to terminate in shallow grooves over the ischiatic foramina. The greater share of this surface looks almost directly outwards and only slightly upwards. The ilio-neural canals are divided by the confluent spines of the first four or five vertebræ, they vary in width in different individuals, and terminate at points opposite the cotyloid cavities, at which point the neural spine suddenly becomes compressed, or rather annihilated, and the sacrum sustains a flattened surface to the ultimate boundary of the bone. The post-acetabular regions are of about one-third the extent of the surfaces anterior to the cotyloid rings; they are produced behind in strong and clubbed processes, the outer margins of which are the terminations of the gluteal ridges or lines continuous with these ridges; these surfaces are convex and narrowed by the encroachment of the broad sacrum (Fig. 103).

Laterally the ilium overhangs the extensive and elliptical ischiatic foramen, which is bounded in front by the anti-trochanter, directed backwards and slightly outwards; the cotyloid ring is markedly circular and but little difference exists between the diameters of its inner and outer peripheries. The obdurator foramen is very small and varies in the figure of its outline, though generally assuming more or less the form of the ellipse; the broad and thin hinder blade of the ischium again dips down to meet the slender pubic shaft, just before its termination, to shut in an elongated spindle-shaped tendinal vacuity. (Fig. 100.)

Upon the ventral aspect of the pelvis, we note that the bone affords no shelter whatever for the important organs it incloses until we pass the fourth sacral segment and the very decided vertebral swelling to form the sinus rhomboidalis; it then drops into a deep depression on either side, whose concavities and convexities correspond with those described and attributed to the dorsal surfaces. The apophysial braces thrown out by the vertebrae are extremely slender, except in the cases of the first and fourth; the former segment bears a free pair of slender pleurapophyses, whose hæmapophyses articulate along the posterior border of the ultimate sternal ribs, as do some of the inferior so-called "costal cartilages" in anthropotomy, lacking the necessary length to arrive at the costal borders of the great ventral hæmal spine, constituting a common ornithic character. These sacral ribs rarely or never support uncinate processes.

Six segments are devoted, in this Shrike, to the coccygeal division of the column, exclusive of the pygostyle; they share the same fate, with their fellows and representatives in nearly all of the class Aves, in having many of their original vertebral components either rudimentary or entirely suppressed; the neural spines, hooking over each other, anteriorly, become more and more feebly developed as we proceed backwards; this order of things is just reversed when we come to examine the hypapophyses on the nether aspects. The neural canal that passes through them dwindles to mere capillary dimensions before reaching the "coccygeal vomer", into which bone it barely dares to enter.

The diapophyses of the caudal vertebræ are bent downwards, compressed horizontally, broad, and show but slight differences in length, before reaching the last one, in which they are shorter. The lamina of the pygostyle has the outline of an isosceles triangle, being truncate at its apex; the "body" below is of a substantial structure, barely dilated behind, and otherwise presenting the usual characteristics as found among the oscines.

The bones of the *scapular arch* are all free and independent of each other, the stability of their relative position depending upon strong ligaments in the living bird. The blade of the *scapula* is quite narrow, and, in the vast majority of cases, extends across the dorsal pleurapophyses, its distal end being obliquely truncate, from within, outwards; the blade-like portion is brought up in close juxtaposition with that portion of the bone that affords the scapular moiety of the glenoid fossa. Its acromial process is very short, owing to the fact that it has to proceed but a short way before it abuts against the much-expanded head of clavicle, on either side; it forms with the coracoid the usual tendinal canal between the two bones. The head of the *coracoid* rears well above the glenoid cavity, in order to afford the required surface upon its mesial aspect for the broad clavicular extremity that rests against it; upon its opposite side it offers the usual surface to assist in completing the cavity for head of humerus. The shaft of the bone is very slender and cylindrical for its major part, and the wing-like extension, so broad in many birds, is here but a meager osseous scale attached to the side of the shaft, for its outer and lower half, becoming continuous with the formal dilatation of the bone below; for the sternal articulation, this is transversely concave and very narrow.

The minute pneumatic perforations of the scapulæ and coracoids occupy their usual sites back of the glenoid cavity, under the protection of the tendinal canal, at the heads of the bones. The united clavicles, or the *furculum*, inclines decidedly to the U-shaped variety (Figs. 94, 95); we have already alluded to the fact as how broad, yet compressed, their scapular ends are found to be; from these heads the shaft-like portions fall downward, with a gentle curve backward to meet and support the mesial and usual clavicular lamina, in birds where it is found, which here lies in that recess formed by the anterior and concave border of the carina of the sternum (Fig. 100).

Directing our attention again to the shoulder-joint we discover that this Shrike is another example of those birds in which that little peglike ossicle, the *os humerò-scapulare* is found, here attached by its usual ligaments to the upper and back part of the articulation and fulfilling its ordinary function. The *humerus* of *Lanius* bears the closest resemblance to that bone as found in many of the family *Turdidæ*—particularly does this apply to *Mimus polyglottus*, a bird the Shrike not unsuccessfully apes in point of external coloration.

The head, in most individuals, is well bent, anconal, and supports a short radial and not lofty crest, with the usual ulnar tuberosity overhanging an ample pneumatic fossa. The shaft is quite straight and nearly cylindrical, its distal and expanded extremity presenting quite a unique appearance (Figs. 96 and 97). The internal and external condyles are distinct processes, the former projecting almost directly backwards, the latter forwards and upwards; the olecranon fossa is likewise clearly defined, and on the palmar aspect we observe the oblique and ulnar facets unusually prominent. The humerus is the only bone of the pectoral limb that has air admitted to its interior, the bones of the antibrachium and pinion lacking this rather rare prerogative.

The *ulna* is more than four times the bulk of the radius, being, as in most vertebrates, the main support of the forearm; there is scarcely any perceptible curvature along its well-balanced and cylindrical shaft, which presents a row of distinct little tubercles for the bases of the quills of the secondaries. Its proximal end presents for examination a prominent olecranon process, directed backwards, and the greater and lesser sigmoid cavities on its anconal aspect; the distal extremity is rather under the average in point of eminence, but shows all the usual indentations and surfaces to accommodate this end of the bone to the wrist and radius. The *radius* differs principally in having a general curvature distributed along its subtrihedral shaft, rather than having it confined to its proximal third, as in many birds; otherwise it presents its ordinary orinthic characteristics.

Among the mature birds representing the *Laniidæ*, as in so many other families, the carpus is composed of the two free ossicles, the *cuneiform* and the *scapho-lunar*, which are here impressed by their usual articulating facettes, for the radial and ulna trochlæ and the metacarpus, and although we have the young of this Shrike before us, the limits of this paper will not allow a critical description of this interesting and important region of the skeleton, that can only be obtained by careful study of the youngling.

The *manus* contains its customary complement of bonelets, as seen in the pinions of the major part of the class in general (Fig. 100); medius and annularis metacarpals are firmly united together, and with the short first metacarpal that bears the index; the broad phalanx of the second is concave upon its anconal aspect and supports below the distal joint of the hand; the smallest phalanx of all is freely attached to annularis, which latter metacarpal extends some little distance below its stouter fellow, the medius. The pelvic limb is non-pneumatic, and consists in the adults of the usual number of bones, the patella being present. The *femur*, less than 2.5 centimeters long, has no trochanter minor, and the larger process of this name is but feebly produced; the head, with its single depression for the ligamentum teres may justly be said to be at right angles with the cylindrical shaft, which latter is slightly convex forwards; the condyles are well developed and the outer one presents the usual fibular groove. The *tibia* presents nothing that differs in any marked extent from the oscines in general; it has no rotular process, but the pro- and ecto-cnemial apophyses are well produced and turned slightly outwards; at its distal end we observe, anteriorly, the usual tendinal bony bridge for the extensor tendons. The *fibula* can be detached from the tibia by maceration, but its lower extremity spins out into a mere thread at the junction of mid and lower thirds of the latter bone. There are no free tarsal segments, and the same remarks apply here as we used in speaking of the wrist-joint above. The *tarso-metatarsus* (Fig. 99) is very delicately constructed below, while above it is stouter and presents immediately back of its head the process we have called *tendinous*, pierced by two pairs of foramina. A thin lamina of bone extends along its shaft behind. We observe that the *os metatarsale accessorium* is unusually large, as is the toe it supports; but otherwise the internodes are arranged upon the general plan of the oscine foot, which brings to our mind nothing of a raptorial type, except, perhaps, *as we know the bird*, the decided curvature of the hind claw, which is still further increased and lengthened when armed with its horny theca.

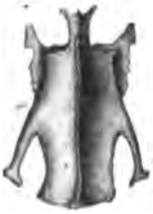


Fig. 92.

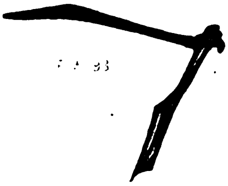


Fig. 93

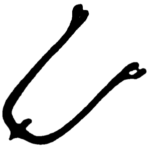


Fig. 94

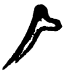
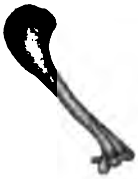


Fig. 95.



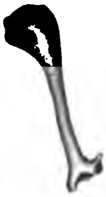


Fig. 97

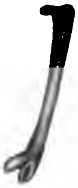


Fig. 98

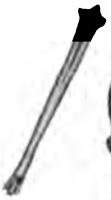


Fig. 99

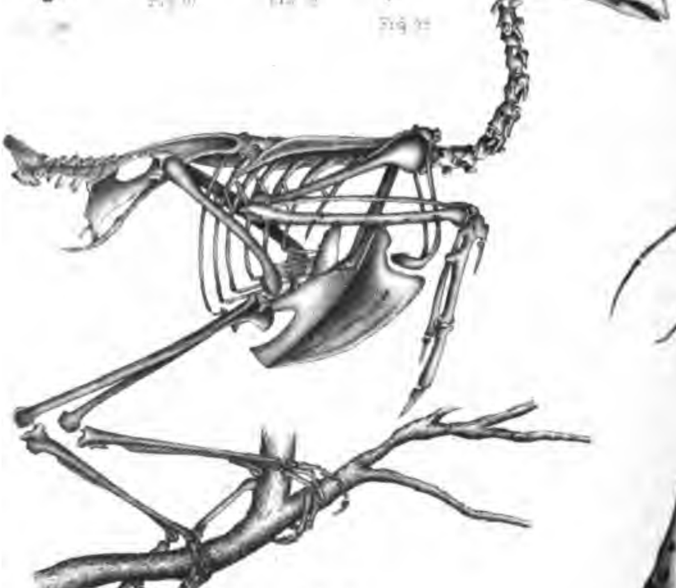


Fig. 100.

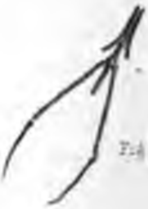


Fig. 101

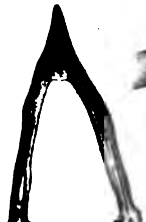


Fig. 102

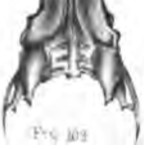


Fig. 103

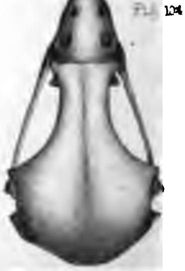


Fig. 104

T. Sinclair & Son

SHUFELDT ON THE OSTEOLOGY OF LANIUS LUDOVICIANUS EXCUBITORIDES.

EXPLANATION OF PLATE XIV.

FIG. 92.—The sternum, from below.
FIG. 93.—Right scapula and coracoid, outer aspect.
FIG. 94.—Clavicular arch, from in front.
FIG. 95.—Head of clavicle, right limb, outer aspect.
FIG. 96.—Right humerus, palmar aspect.
FIG. 97.—The same, anconal aspect.
FIG. 98.—Right femur, posterior aspect.
FIG. 99.—Left tarso-metatarsus, anterior aspect.
FIG. 100.—Skeleton of adult ♂, *Lanius ludovicianus excubitorides;* the left free vertebral pleurapophyses and hæmapophyses and pectoral limb have been removed.
FIG. 101.—The hyoid arch, from above.
FIG. 102.—The lower mandible, from above.
FIG. 103.—The pelvis, from above.
FIG. 104.—Superior aspect of skull, the lower mandible having been removed.

Art. XV.—Review of the Rodentia of the Miocene Period of North America.

By E. D. Cope, N. A. S.

RODENTIA.

Members of this order were very abundant during the White River and Truckee epochs in North America. They are referable to thirty-one species and eight genera. Of these genera three still exist in the regions where their fossil remains are found. These are *Sciurus*, *Hesperomys*, and *Lepus*. All of them occur in the Truckee beds, while the first-named only has been found in the White River formation. All of the species belong to the three great divisions of the order which now inhabit North America, while the fourth, the *Hystricomorpha*, which is very sparingly represented on the continent, has not yet been detected in the formations in question. It appears in a single species of porcupine in the Loup Fork beds.

The four primary divisions of the order *Rodentia* are thus defined, principally after Brandt and Alston.

I. Incisor teeth $\frac{2}{2}$. Fibula not articulating with the superior condyle of the calcaneum. No intertrochlear crest of humerus.
  1. Mandible with the angular portion springing from the outer side of the bony covering of the lower incisor. Fibula distinct from tibia. "Malar bone not supported below by a continuation of the maxillary zygomatic process." An interpterygoid fissure.................................HYSTRICOMORPHA.
  2. Mandible with the angle in the plane of or springing from the inferior edge of the covering of the alveolus of the inferior incisor, more or less rounded; coronoid process high, falcate. Fibula distinct from tibia. No interpterygoid fissure...SCIUROMORPHA.
  3. Mandible with the angular portion springing from the inferior edge of the sheath of the inferior incisor (except *Bathyerginæ*). Fibula coössified with the tibia. Malar short, usually supported on a maxillary process. No interpterygoid fissure (except in *Bathyerginæ*) ....MYOMORPHA.

II. Incisor teeth $\frac{4}{2}$. Fibula articulating with the condyle of the calcaneum. An intertrochlear crest of humerus.
  4. No true alisphenoid canal; fibula ankylosed to tibia below; angle of mandible in the plane of the incisive alveolus.....................LAGOMORPHA.

These groups, as is well known, include families and genera which display adaptations to various modes of life. Some are exclusively subterranean, others are arboreal, and some live on the surface of the ground. Of the latter, some are provided with formidable spines as a protection against enemies, while others depend for their safety on their speed. Of the latter character are the *Leporidæ* of the *Lagomorpha*, and I wish to note how that they have superadded to the ordinary rodent structure certain points which also characterize the most specialized *Perissodactyla* and *Artiodactyla* among ungulates. The fusion of the inferior part of the fibula with the tibia (found also in the *Myomorpha*) belongs to the higher types of these orders. The strong intertrochlear ridge of the humerus is an especial feature of the groups mentioned, distinguishing them from the lower types in all the orders. The articulation of the fibula with the calcaneum, mentioned by Mr. Alston, is a character of the of the *Artiodactyla*. Associated with these is the elongation of the bones of the limbs, especially the posterior one. The modification of the tarsus in *Dipus* (the jerboas) evidently has a direct relation to the projectile force transmitted through the hind legs in rapid progression by leaping. Here the metatarsals are coössified into a cannon bone, though, as there are three bones involved, the result is somewhat different from the cannon bone of the *Ruminantia*.

The species of the American Miocenes, including Loup Fork formation, are distributed as follows:

	White River.	Truckee.	Loup Fork.
HYSTRICOMORPHA.			
Hystricidæ.			
Hystrix, L	....	....	1
SCIMOMORPHA.			
Mylagaulidæ.			
Mylagaulus, Cope	....	....	2
Fam.?			
Heliscomys, Cope	1	....	....
Castoridæ.			
Eucastor, Leidy	....	....	1
Castor, L	1	2	1
Ischyromyidæ.			
Ischyromys, Leidy	1	....	....
Sciuridæ.			
Meniscomys, Cope	....	4	....
Gymnoptychus, Cope	2	....	....
Sciurus, Linn	1	2	1
MYOMORPHA.			
Muridæ.			
Eumys, Leidy	1	....	....
Hesperomys, Waterh	....	1	1
Paciculus, Cope	....	2	....
Geomyidæ.			
Pleurolicus, Cope	....	3	....
Entoptychus, Cope	....	5	....
LAGOMORPHA.			
Leporidæ.			
Palæolagus, Leidy	4	1	....
Panolax, Cope	....	....	1
Lepus, Linn	....	1	....

Many of the above genera stand in evident genetic connection with existing forms. The Miocene Castors doubtless include the ancestor of the modern beaver. The *Ischyromys* is a primitive type of the *Sciuridæ*, and *Gymnoptychus* connects it directly with the existing forms by the character of its molar teeth. *Eumys* is the primitive form of *Hesperomys*, as *Paciculus* is of *Sigmodon*. *Entoptychus* and *Pleurolicus* are the near ancestors of the *Geomyidæ* of the Pliocene and present periods. *Palæolagus*, *Panolax*, and *Lepus* form a direct genetic line. The ancient genera all differ from their modern representatives in the same way; that is, in the greater constriction of the skull just posterior to the orbits and accompanying absence of postorbital processes. This relation may be displayed in tabular form as follows:

Skull wider behind orbits.		Skull narrower behind orbits.	
Postorbital processes.	No postorbital processes.	Postorbital processes.	No postorbital processes.
	Castor fiber		Castor peninsulatus
Sciurus			Ischyromys
	Hesperomys		Eumys
Lepus			Palæolagus

None of this species of this fauna are of larger size than their modern representatives. In the cases of the beaver, squirrels, and rabbits, the ancient species are the smaller.

SCIUROMORPHA.

SCIURUS Linn.

In this genus the molars are $\frac{5}{4}$ or $\frac{4}{4}$, the first superior small when present. The grinding surfaces of the crowns when unworn present in the superior series a single internal cusp, which is low and antero-posterior. From this there extend to the external border of the crown two low transverse ridges, whose exterior terminations are somewhat enlarged. In the lower jaw the transverse ridges are not visible, and there is a low tubercle at each angle of the crown, between which there may be others on the border of the crown. Attrition gives the grinding surface of the latter a basin-like character. The *foramen infraorbitale* is a short, narrow fissure, situated in the inferior part of the maxillary bone in front of its tooth bearing portion, but descending nearly to the level of the alveolar border.

The well-known characters of this genus are found in the mandibles of species which I obtained from the White River Miocene beds of Colorado and Oregon. The teeth display the subquadrate form of this genus, without any tendency to the transverse enlargement seen in *Arctomys*, *Cynomys*, and *Spermophilus*. Two of the species, *S. vortmani* and *S. relictus*, are as large as our gray and red squirrels, respectively, and the third, *S. ballovianus*, is about the size of the *Tamias quadrivittatus*.

GYMNOPTYCHUS Cope.

Paleontological Bulletin, No. 16, p. 5 (August 20, 1873); Ann. Report U. S. Geolog. Surv. Terra. 1873 (1874), p. 476.

Dental formula: I. $\frac{1}{1}$; C. $\frac{0}{0}$; M. $\frac{4}{4}$. Crowns of the superior molars supporting two crescents on the inner side, and two cusps on the external side opposite to them. Each cusp sends a transverse crest to the concavity of the corresponding crescent. The adjacent horns of the crescents are united, and the connecting portion sends a transverse crest into the interval between the cusps. The opposed horns of the two crescents each send a crest round the anterior and posterior sides of the crown, of which they form the borders. Incisors simple. The walls of the alveolus of the inferior incisor produced into a tuberosity on the external side of the base of the ascending ramus.

The above characters define a genus which, when fully known, will in all probability be referred to near the existing genus *Sciurus*. In confirmation of this opinion, I add that the alveolar sheath of the inferior incisor is in the vertical plane of the ramus; the incisive foramen does not invade the maxillary bones, and the *foramen infraorbitale exterius* is a small fissure situated in the inferior portion of the maxillary bone, well in advance of both the orbit and first molar tooth.

As compared with the existing genera, it differs in the structure of the molar teeth. The arrangement of the tubercles and crests is more complex than in any of them, excepting *Pteromys*. Thus in all of them there is but one internal crescent of the superior molars, and but two or three cross-crests; while in the inferior molars the arrangement is unlike that of the superior teeth, the cross-crests being marginal only. In *Pteromys* (F. Cuv.) the transverse valleys of the inferior series of *Gymnoptychus* are represented by numerous isolated fossettes. The structure of the molars in the fossil genus is exactly like that which I have described above as found in *Eumys*, extending even to the details. This is curious, as that genus is a Myomorph.

The protrusion of the posterior extremity of the alveolar sheath of the inferior incisor on the outer side of the ascending ramus is not exhibited by the North American *Sciuridæ*, which I have examined, nor by any of the extinct genera herein described, excepting *Castor* and the *Geomyidæ*. It is seen in a lesser degree in *Mus musculus*, *Hesperomys leucopus*, *Meriones hudsonius*, and *Arvicola riparia*, all *Muridæ*.

Whether this genus possesses a postfrontal process I have been unable to ascertain. Its absence would not in my opinion isolate it from the *Sciuridæ*, as I accord with Dr. Coues in his estimate of the value to be attached to this character.

Of other portions of the skeleton I possess incomplete humerus, ischium, femur, and tibia. Most of these are appropriate in size to the *G. minutus*, which is also the most abundant species. A fragment of a larger femur belongs perhaps to the *G. trilophus*.

The *humerus* is rather slender, and the deltoid crest does not exhibit the prominence so usual in the *Muridæ*. It is most prominent on the antero-external aspect of the shaft near its middle; an external as well as an anterior ridge diverges from it upwards. The condyles have no intertrochlear ridge, and the external trochlea is not more extended transversely than the internal, measuring from the fundus of the groove. There is a moderate internal epicondyle, and the arterial foramen is distal, and opens anteriorly below and on the external face above. The bridge is slender and moderately oblique. The external border is acute and twisted.

The *ischium* is characterized, like that of other *Sciuridæ*, by the presence of a spine or process which is wanting in North American *Muridæ*, but is present in *Perognathus*. The bone is rather short, the tuberosity is but little enlarged, and the pubic process not very wide. The proximal end of a *femur* may belong to *Eumys elegans*, but is too small according to usual data. The great trochanter is elevated as high as the head, from which a deep notch separates it; its posterior or fossa is pronounced. The little trochanter is very prominent, projecting at right angles to the shaft. The shaft is broken, so that the presence of a third trochanter cannot be ascertained. The distal end of the femur is characterized by a patellar groove of moderate width, with fairly elevated ridges which are continued well posteriorly on the shaft, but not further than in existing *Sciuridæ*, and not so far as in *Palæolagus*. The distal extremity of the *tibia* displays characters of the *Sciuridæ* as distinguished from those of *Muridæ* and *Leporidæ*. The fibula is of course distinct, and the external trochlear groove opens from its fundus outwards. The internal groove is narrower and is bounded internally by a vertical malleolus, which has no distal articular facets, and which does not project, but is flat on the inner side. The greater part of the posterior face is occupied by the bones of the wide groove for the tendon of the *flexor longus pollicis* muscle. Its inferior edge is produced downwards as far as the malleolus, from which is is separated by the deep groove for the *tibialis posticus* and *flexor longus digitorum* muscles. This groove is marked on the inner side of the distal portion of the shaft, its anterior border being especially well defined.

Two species of this genus are certainly known. They belong to the White River horizon of Colorado. They differ, so far as known, chiefly in size, and in the proportions of the inferior premolar tooth.

MENISCOMYS Cope.

Paleontological Bulletin No. 30, p. 5, Dec. 3, 1878; Proceedings American Philosophical Society, 1878 (1879), p. 67.

The characters of this genus are derived from the dentition of both jaws, and from portions of the cranium which are preserved. The molars are rooted, and number $\frac{5}{4}$ or $\frac{2}{1}$ $\frac{3}{3}$. Those of the superior series are without enamel inflections, and the triturating surface exhibits two external and one internal crescentic sections of the investing enamel. On the second superior molar there are three external crescents, and the first molar is simply conic. Between the inner and external crescents there are the curved edges of enamel plates directed obliquely and transversely. The grinding surfaces of the inferior molars display, in the unworn condition, curved transverse crests, connected longitudinally on the median line; on wearing, the lateral emarginations of the enamel become shallower, disappearing from the inner side, but remaining on the outer. Incisor teeth not grooved. *Foramen infraorbitale anterius* small, inferior, and near the orbit. Postorbital processes; no sagittal crest.

The characters of the dentition of this genus resembles those of the genus *Pteromys*, which is now confined to Asia and the Malaysian Archipelago. The superior molars differ from those of *Pteromys* in wanting all re-entrant enamel inflection.

The general characters of the skeleton are unknown. A femur is rather slender, and a tibia rather elongate, showing that the limbs are not short.

Four species of this genus are known to me, all from the Truckee Miocene of Oregon. They differ considerably in the details of the structure of the molar teeth. Their more prominent characters may be set forth as follows:

I. Superior molars short-rooted, with the external face plane; inferior molars with a prominent median transverse crest.
Smaller; dental crests fewer, simple, not crenate.......................*M. hippodus.*
II. Superior molars long-rooted; external face of crowns inflected forming two V's; no median transverse crest on inferior molars.*
a. Crests of superior molars fewer, simple, not crenate.
Larger; crowns short...*M. liolophus.*
aa. Crests of superior molars more numerous and much crenate.
Smaller; plications of inferior molars shallow; borders raised.........*M. cavatus.*
Larger; plications of inferior molars profound.........................*M. nitens.*

There is a suggestive resemblance between the forms of the molar teeth of the *Meniscomys hippodus* and those of the *Haplodontia rufa* now living in Oregon. The two genera have doubtless had a common origin, but the present differences are considerable. Thus the *Haplodontia* has an extended osseous cavum tympani, which does not exist in *Meniscomys*.

This genus appears to be referable to the *Sciuridæ*.

ISCHYROMYS Leidy.

Proceed. Acad. Nat. Sci. Philad. 1856, p. 89; Extinct Fauna Dakota and Nebraska 335.—*Colotaxis* Cope, Paleontological Bulletin, No. 15, p. 1.

Char. gen.—The essential features are, dentition, I., $\frac{1}{1}$; C., $\frac{0}{0}$; M., $\frac{5}{4}$; the molars with two crescents on the inner side above, each of which

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*Not seen in *M. liolophus.*

gives rise to a cross-ridge to the outer margin. In the mandibular series the crests and crescents have a reversed relation. No cementum.

To the above characters given by Dr. Leidy, I have added the absence of postfrontal processes, and the superior position of the infraorbital foramen. I now add that the pterygoid fossa is large, and that its inner and outer plates are well developed, and subequal. The palate is excavated posteriorly. The acuminate anterior part of the malar bone extends as far forwards as the front of the orbit. There is no tuberosity on the side of the superior diastema near the premolar teeth. In the mandible the posterior extremity of the incisive alveolus is not distinct from the ascending ramus.

Nothing has been heretofore published respecting the characters of the remaining portions of the skeleton. Those which I possess are the distal extremities of humeri, and a tibia, astragali, and portions of the pelvis. The condyles of the humerus are narrow antero-posteriorly. The internal flange descends at once to the fundus, leaving a long external cylindrical portion without intertrochlear ridge. Anteriorly this portion is cut into for half its length by the ligamentous fossæ. There is a large internal epicondyle, which is constricted by a neck at the base, and presents a compressed edge inwards and upwards. The arterial canal opens above on the interior side of the humerus. There is no external epicondyle.

The section of the *ilium* at its base and at its middle is triangular. There is an angle along the middle of its external face which supports a moderately prominent tuberosity, a little above the acetabulum. On the anterior margin a little higher up is a short, compressed, rather prominent process, which probably represents the anterior inferior spine. From this point posteriorly the internal face of the ilium is deeply concave, producing an attenuation of the inner wall of the acetabulum. The ischium is rather narrow at the base.

The distal portion of the tibia is much like that of *Arctomys*, *Gymnoptychus*, and other *Sciuridæ*. The posterior median process is very large and is shallowly grooved; the usual deep tendinous groove separates it from the internal malleolus. The trochlear grooves are deep and well separated; the fibular surface is short. The head of the astragalus is horizontally oval, and is separated from the trochlear portion by a neck of moderate length. It extends obliquely inwards, so that the internal margin of the head is interior to the line of the inner margin of the trochlea. The sides of the latter are vertical. It is considerably wider than long; the trochlear carinæ are marginal, and the external is considerably more elevated than the inner. The separating groove is profound but open. The posterior inferior fossa is small and foramen-like.

Besides the very different form and position of the infraorbital foramen, this genus differs from *Gymnoptychus* in the excavation of the posterior edge of the palate.

Dr. Leidy remarks that this genus belongs to the family of the *Sciuridæ*. This is indicated by the dental characters; but in some other respects there is a greater divergence from the squirrels and marmots than is the case with the preceding genus, *Gymnoptychus*. Thus, the large *foramen infraorbitale anterius* occupies the elevated position at the origin of the zygomatic arch seen in the porcupines and cavies. There is no superciliary ridge nor postorbital process as in most *Sciuridæ*, but the front is contracted between the orbits in the same manner as, but to a less degree than, in *Fiber*, and the Eocene *Plesiarctomys*, Brad. Both the last named and *Ischyromys* present many points of resemblance to Pomel's tribe of *Protomyidæ*, but differ from any of the genera he has included in it.

This family is thus defined by Pomel:* "infraorbital foramen large as in the *Hystricidæ*, and by the position of the angular apophysis of the mandible almost in the general plane of the horizontal ramus. The jugal bone, at least in those species where we have observed it, is very much enlarged at its anterior portion, and the orbit is almost superior."

These characters apply to *Ischyromys*, excepting as regards the malar bone, which is principally unknown in the latter.

Another family, the *Ischyromyidæ*, has been proposed by E. R. Alston for the reception of this genus, to which he thinks with me† *Plesiarctomys* (= *Pseudotomus*) should be referred. He thus defines the family:‡ "Dentition as in *Sciuridæ;* skull resembling *Castoridæ*, but with the infraorbital opening large, a sagittal crest; no postorbital processes; palate broad; basioccipital keeled."

Doubtless *Ischyromys* belongs to an extinct family, but which of the above names is available for it I do not yet know. I would characterize it as follows:

Dentition as in *Sciuridæ;* infraorbital foramen large, superior; pterygoid fossa large, with well-developed exterior as well as interior walls; a sagittal crest.

The superior position of the infraorbital foramen and the well-developed pterygoid laminæ are characters found in the *Muridæ*.

But one species of this genus is known.

CASTOR Linn.

Syst. Nat. I, p. 78, 1766.—*Steneofiber*, E. Geoffr., Revue Encyclopédique, 1833.—"*Chalicomys* Meyer, Neues Jahrbuch, 1838, p. 404, et 1846, p. 474."—*Palæocastor* Leidy, Extinct Mammalia Dakota and Nebraska, 1869, p. 338.

The family of the *Castoridæ* differs from the *Sciuridæ* in the absence of postorbital angles or processes and the presence of a prolonged tube of the meatus auditorius externus. In both of these points it agrees with the *Haplodontiidæ*, a family which Mr. Alston has distinguished from the *Castoridæ* on various grounds. I do not think any of his characters are tenable, excepting that drawn from the form of the mandible, which is expressed thus in Mr. Alston's diagnosis: "angular portion of mandible much twisted." This character will be better described as follows: Angle of mandible with a transverse edge due to inflection on the one hand, and production into an apex externally; the inflection bounding a large interno-posterior fossa.

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* Catalogue Method. et Descr. de Vertébrés Foss. de le Bass. de la Loire, 1853, p. 32.

† Annual Report U. S. Geol. Survey Terrs. 1873 (1874), p. 477.

‡ Proceed. Zool. Society London, 1876, p. 78.

Mr. Alston enumerates four genera of *Castoridæ*—*Castor*, *Diobroticus*, *Steneofiber*, and *Castoroides*. J. A. Allen has shown that the last-named genus cannot be referred to this family. The characters of *Diobroticus*, as given by Alston, are as follows: "Skull much as in *Castor*. Third upper molar and lower premolar elongate, with four enamel folds, the rest with only two; all the folds soon isolated." This diagnosis appears to separate the genus satisfactorily. The definition of *Steneofiber* is as follows: "Parietals not parallelogrammic; interparietal subhexagonal; basioccipital not concave; grinding teeth as in *Castor*, the subsidiary folds sooner isolated." The distinction from *Castor* here rests exclusively on the forms of the parietal, interparietal, and basioccipital bones. This kind of definition is always of questionable validity, as the terms "parallelogrammic," "hexagonal," etc., are not intended to be exactly used and cannot be exactly applied. The *Castor* (*Steneofiber*) *peninsulatus* illustrates this fact, for there is no striking difference in the forms of the two bones to which these terms are applied, as compared with the *Castor fiber*. The basioccipital bone differs from that of the beaver, but not so as to conform to J. W. Alston's diagnosis of the genus *Steneofiber*. Its inferior surface is concave, but doubly so, as a keel occupies the median line. In the *S. viciacensis*, according to Filhol, this region is shallowly concave, without median keel. Although important as specific characters, these variations do not appear to me to require the recognition of as many genera. The possession of the epitrochlear foramen in the *S. viciacensis* is at first sight an important character. Mr. Filhol, however, informs us that of thirty-four humeri which he has studied, sixteen possess the foramen, and in eighteen it is wanting.

The *Castor tortus* was described by Leidy from the Loup Fork formation. He coined the subgeneric name *Eucastor* for it without corresponding definition. In his monograph of the *Castoridæ*, J. A. Allen referred this species* to a genus distinct from *Castor*, and defined it, using for it Leidy's name *Eucastor*. This genus appears to me to be valid. The three genera of *Castoridæ* will then be defined as follows:

Molars and premolars with one inner and two or three outer folds .... *Castor*.
"Inferior premolar and third superior molar elongate, with four enamel folds; the rest with only two." .... *Diobroticus*.
Superior premolar enlarged, with one inner fold; inferior molars small, with two lakes. .... *Eucastor*.

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* Monographs of North American Rodentia, Coues and Allen, U. S. Geol. Surv. Terrs., 1877, xi, p. 450.

Some affinity probably exists between this family and the *Mylagaulidæ*, which followed in the Loup Fork epoch.

The species of *Castor* may be distinguished as follows. I do not know the *C. nebrascensis** from the White River, nor the occipital bone of the *C. pansus*,† from the Loup Fork formation.

I. Basioccipital bone deeply concave below:
  Angle of lower jaw not deflected..*C. fiber*.
II. Basioccipital shallowly concave below:
  Angle of lower jaw deflected ....*C. viciacensis*.
III. Basioccipital concave below with a median keel: angle of lower jaw not deflected.
  Palate wider; size medium ....*C. peninsulatus*.
  Palate narrower; size small..*C. gradatus*.

CASTOR PENINSULATUS Cope.

Steneofiber? nebrascensis Leidy, Cope, Bulletin U. S. Geological Survey Terrs. V, 1879, p. 55.

This species is about the size of a large prairie marmot—*Cynomys ludovicianus*. It was abundant in Oregon during the period of the Truckee Miocene. Leidy originally described the closely allied *C. nebrascensis* from the White River beds of Nebraska, but I have never obtained it from that formation. Another and similar species, *C. pansus* Cope, is common in the Loup Fork beds of Nebraska and New Mexico.

Several well-preserved skulls from Oregon display characters not visible in specimens heretofore collected, and which enable me to make fuller comparisons with the European *C. viciacensis*, so fully described by M. Filhol.‡

The postorbital constriction is much greater in this species than in the *C. viciacensis*, and greater than in the *C. nebrascensis* from the White River beds. The straight anterior temporal ridges are in line with the superciliary borders, and unite into a sagittal crest at the constriction. In the *S. viciacensis* they continue separate beyond this point one-fourth the distance to the supraoccipital crest. The zygomata are wide, and the malar ridge is very prominent anteriorly, overhanging the face, and curving rather abruptly to the base of the muzzle. The latter is rather wide, with parallel sides, and is flat above. The brain-case expands rather abruptly from the interorbital constriction, and is rather flat above. The infraorbital foramen is a narrow vertical oval and is situated low down in the vertical line with the anterior extremity of the malar angular edge. It is a little nearer the line of the first molar than the posterior border of the superior incisor. The incisive foramina are relatively larger than in the beaver, and are chiefly in the premaxillary bone. The palate between the anterior molars is as wide as the transverse diameter of the first molar. There is no distinct fossa of the maxillary bone in front of the orbit as represented by Filhol in the *C. viciacensis*. The pterygoid fossa is wide, with the inner process the longer, and reaching the otic bulla. The latter are large and obliquely placed; the meatal borders are produced into a short tube which is not so long as that of the *C. fiber*. Its superior border is quite prominent, overhanging the inferior, and projecting more than represented by Mr. Filhol in the *C. viciacensis*. There is a strong ridge of the squamosal bone extending posteriorly from the base of the zygomatic process, which overhangs a fossa. This fossa is further defined posteriorly by the tympanic tube. The fossa is larger and deeper than in either *C. fiber* or *C. viciacensis*. Below its superior bounding ridge is a large subsquamosal foramen. The mastoid bone is distinctly exposed between the squamosal and the occipital, and its surface is separated from that of the former by a groove which is not so well marked in the *C. fiber*. Its inferior angle is in contact with the bulla, and is shorter than the paroccipital process. The latter is short, not extending below the line of the condyles, and is directed downwards, not posteriorly as in *C. fiber*. The occiput is nearly vertical and flat, excepting laterally, where there are two fossæ, a superior and inferior, the latter the longer, and extending to the inferior surface.

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* *Steneofiber nebrascensis* Leidy, Proceed. Academy Phila., 1856, 89; 1857, 89; *Chalicomys nebrascensis* Leidy, l. c., 1857, 176; *Palæocastor nebrascensis* Leidy, Ext. Mammalia Dakota and Nebraska, 1869, p. 338, xxvi, Figs. 7–11.

† *Steneofiber pansus* Cope, Report Capt. G. M. Wheeler, iv, pt. ii, 1877, p. 297.

‡ Étude des Mammifères Fossiles de Saint-Grand-le-Puy, Allier. Bibl. de l'École es Hautes Études, XIX, Art. I, p. 44, 1879.

The premaxillo-maxillary suture is just half way between the anterior molar and the superior incisor, and is vertical to opposite the middle of the incisive foramen, and then turns backwards. The fronto-maxillary and fronto-nasal sutures are in one transverse line across the front. The malar-maxillary suture is behind the anterior border of the zygoma, thus confining the malar bone to the zygoma. The latter is much expanded in a vertical direction, but has no postorbital angle, resembling in this respect the *C. viciacensis* rather than the *C. fiber*. Its posterior portion extends well posteriorly and below almost all of the squamosal part of the zygoma. The parietal is of a parallelogrammic form; the anterior inner border cut obliquely by the frontal, and the posterior inner border cut out for the supraoccipital. The latter bone has an oval form, narrowed anteriorly and truncate posteriorly.

I describe a mandibular ramus of a second individual. It unfortunately has the coronoid and the angle broken off. The base of the latter is concave on the inner side. The external face of the ramus is everywhere convex. The base of the coronoid is separated from the molar line by a wide groove. The anterior base is opposite the second molar. The incisive alveolus is continued upwards and backwards, and ceases in a protuberance which is external to the plate which connects the condyle with the coronoid process, and is separated from it by a fossa. The condyle is subglobular, and has considerably more external than internal articular surface. The series of inferior molar teeth is quite oblique, descending posteriorly.

Dentition.—The grinding surfaces of the superior molars are none of them longer than wide, and in all but the first the transverse diameter exceeds the antero-posterior. The dimensions diminish posteriorly in all the measurements. There is one inflection of the sheathing enamel on each side of the crown in all the molars in their present state of wear. The positions of the lakes indicate that in an earlier stage there were two external inflections. At present all the molars display a fossette external to the fundus of the internal inflection. Besides this there are two others in the first molar, and one other in the fourth. Posterior to the external inflection there is one fossette in the first and third molars, two on the fourth, and none on the second, where it is probably worn out. According to Leidy there are three in this position in all the molars in the *C. nebrascensis*, and two in the position first described. According to Filhol, there is but one in each position, in about the same stage of wear, in the *C. viciacensis*.

The inferior molars display a deep external inflection, and three transverse lobes on the inner side. These probably represent inflections at an earlier stage of wear; the median one is still continuous with the sheathing enamel on the first molar (Pm. IV). The sizes of the inferior molars increase anteriorly regularly, excepting that the first is relatively a little longer than the others.

Measurements of skull.

		M.
Length from inion to edge of nasals		.067
Length from edge of nasals to interorbital constriction		034
Length of muzzle to preorbital angle of maxillary		.018
Width of skull at paroccipitals		.025
Width of skull at posterior edge of squamosal		.034
Width at zygomata posteriorly		.056
Width at interorbital constriction		.006
Width between anterior parts of orbits		.0275
Width at base of muzzle		.018
Length from occipital condyle to front of otic bulla, inclusive		.018
Length from bulla to last molar tooth		.008
Length from first molar to base of incisor		.023
Length of superior molar series		.0195
Diameters of first molar	anteroposterior	.0045
	transverse	.0045
Diameters of fourth molar	anteroposterior	.0030
	transverse	.0035

Measurements of mandible.

Length from condyle to incisor tooth		.0390
Length from incisor to Pm. IV		.0105
Length of inferior molar series		.0145
Diameters of Pm. IV	anteroposterior	.0047
	transverse	.0040
Diameters of M. I	anteroposterior	.0030
	transverse	.0040
Diameters of M. IV	anteroposterior	.0030
	transverse	.0035
Depth of ramus at diastema		,0100
Depth of ramus at Pm. IV		.0130
Depth of ramus at M. III		.0100

A few bones accompany the mandible, all having been cut from the same fragment of matrix. The head of the femur is perfectly round, and is bounded by a well-defined neck. The great trochanter incloses a large fossa. The lesser trochanter is large; the third trochanter is not prominent as it is in *C. viciacensis*. The shaft is generally flattened, with its long diameter transverse. The condylar extremity is flattened, and the rotular groove is wide, and the condyles well separated. The epicondylar angles are distinct, but not so prominent as in *S. viciacensis* (see Filhol, *l. c.*, Pl. VI, Figs. 13, 14). ' The general form of the femur is robust, as in that species.

The distal extremity of the tibia resembles that of *Sciuridæ* generally, especially in the large size of the external posterior angle. Its diameters are small, and the distal part of the shaft is slender and subcylindrical. The crest extends well down from the proximal end, being much stronger than in the true squirrels, and bounds a longitudinal fossa. The fibular facet of the tibia overhangs extensively, and bounds a rather narrow proximal fossa. This continues into a narrow shallow groove on the posterior face of the shaft, which disappears near the middle of its length. The proximal half of the shaft is much compressed. The inner face is smooth and gently convex. The crest sinks rapidly into the head, and the femoral facets are well separated. The tibia resembles that of *C. viciacensis*, but is more compressed in its proximal half.

Measurements of hind leg.

		M.
Length of femur		.057
Width of femur at head		.019
Width of femur shaft below third trochanter		.009
Width of femur at epicondyles		.015
Width of condyles of femur		.013
Antero-posterior diameter at condyles		.011
Antero-posterior diameter of head		.009
Diameters of head of tibia	anteroposterior	.012
	transverse	.014
Diameters of distal end of tibia	anteroposterior	.0080
	transverse	.0085
Antero posterior diameter	above middle	.010
	below middle	.005

I have referred to this species in former catalogues of the vertebrate fauna of Oregon as the *Castor nebrascensis* of Leidy. It is very nearly allied to that species, but I find the following differences: First, the postorbital constriction is narrower; second, there are fewer fossettes on the posterior half of the molar teeth, but one or two. Leidy figures two or three in the species described by him.

MYLAGAULUS Cope.

Bulletin U. S. Geological Survey of the Territories, IV, p. 384, May 3, 1878.

Inferior molars three, rootless; the first much larger than the others. Enamel inclosing the first molar not inflected; but numerous fossettes on the grinding surface of the crown, whose long diameter is anteroposterior.

The only lower jaw of a species of this genus in my possession presents a small part of the base of the angle and of the coronoid process. These parts are so nearly in the plane of the incisive alveolus as to lead to the belief that the genus *Mylagaulus* belongs to the suborder *Sciuromorpha*. The rootless teeth with deep enamel fossettes approximates it to the *Castoridæ*, but it appears to me that a new family group must be established for its reception.* Such characters are the presence of only three inferior molars, and the entire independence of the enamel fossettes of the external sheathing enamel. It is worthy of investigation whether the *Hystrix refossa* Gerv. has any relation to this family.

As a generic feature, the preponderance of the first true molar over all the others is remarkable. It performed the greater part of the masticatory function, as the second molar is a small tooth, and the third one quite insignificant, and in the *M. monodon* probably early shed.

The genus is only known from the Loup Fork formation. There are two species, both from the adjacent regions of Kansas and Nebraska.

MYLAGAULUS MONODON Cope.

American Naturalist, 1881, July.

The larger species, and represented by a left mandibular ramus, from which the more fragile parts have been broken. The form of the ramus is rather compressed and deep, and the line of molar teeth is very little oblique to its plane. The diastema is short and concave, and the incisive alveolar margin is elevated. The base of the coronoid process originates opposite the middle of the second molar. The internal and external faces of the ramus are nearly plane, and the inferior border is transversely rounded behind the position of the incisive alveolus. The The masseteric fossa is not defined below, and its anterior oblique bounding ridge is indistinct.

The alveolus of the third molar is close to the fundus of the incisive alveolus, and is so shallow as to lead to the belief that it is readily and early shed. That of the second molar is much deeper; it is small, and its long axis is directed at 45° angle inwards and forwards. The ledge between it and the base of the coronoid process is rather wide. The masticating surface of the first molar is longer than wide, forming an oval rather narrower anteriorly than posteriorly. Its extent on a line drawn through the centers of the alveoli is twice as great as that of the second molar. The fossettes are linear, and lie in three parallel lines. The internal line contains three fossettes, the middle one three, and the internal one two. The anterior one of the internal line does not extend so far anteriorly as the extremities of the other two lines; its posterior end also is not in line with the posterior fossette of the same line, but begins opposite the space between it and the last fossette of the middle series. The inferior incisor is rather large. Its section is nearly triangular. The enamel face is entirely smooth.

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* See American Naturalist, July, 1881, where this is done.

Measurements.		M.
Length of ramus included in chord of incisor tooth		.0300
Length of inferior molar series		.0200
Diameters grinding surface M. I	anteroposterior	.0105
	transverse	.0060
Elevation grinding surface, M. I., inner side		.0032
Length of diastema		.0100
Width anterior surface of incisor		.0050
Depth of ramus at M. III		.0155

This species was about the size of the wood-chuck (*Arctomys monax*), to judge by the dimensions of its lower jaw. It is larger than the *M. sesquipedalis*, and has a different arrangement of the enamel fossettes. In that species, instead of being in three parallel lines, the middle line is only represented by its extremities. At the middle of the crown the fossettes of the internal line are incurved so as to be nearly in contact with the fossettes of the external line.

The *Mylagaulus monodon* was discovered by Wilbur J. Brous in Hitchcock County, Nebraska.

HELISCOMYS Cope.

Synopsis of New Vertebrata from Colorado (Miss. Pub. U. S. Geol. Survey Terrs.), 1873 (October), p. 3; Annual Report U. S. Geol. Survey Terrs. 1873 (1874), p. 475.

Inferior molars four, rooted, the crowns supporting four cusps in transverse pairs. A broad ledge or cingulum projecting on the external side from base of the cusps. The inferior incisor compressed, not grooved, and with the enamel without sculpture.

This genus is only represented by a small number of specimens, which are mandibular rami exclusively. Its special affinities therefore cannot be ascertained, and even its general position remains somewhat doubtful. There is some probability however that it belongs to the *Myomorpha*, as the type of dentition is much more like that of the genera of that group than those of the *Sciuromorpha*. To the *Hystricomorpha* it does not belong.

As compared with known genera of *Myomorpha*, it is at once separated from many of them by the presence of a premolar tooth. Among recent genera of this suborder, *Sminthus* possesses this tooth in both jaws, and *Meriones* in the upper jaw only. It is present in both jaws in the *Sciuromorpha* generally. The tubercles of the teeth resemble those of the *Muridæ*, but their disposition is unlike that of any existing North American genus. A remote approximation to it is seen in the genus *Syllophodus** of the Bridger Eocene formation, where there are four subquadrate molars with tubercles; but the latter form two transverse crests, with an additional small intermediate tubercle, and the wide cingulum is absent.

But one species of *Heliscomys* is known, the *H. vetus*.

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* *Myops* Leidy ("*Mysops*") preoccupied.

MYOMORPHA.

EUMYS (Liedy nom.) Cope.

Annual Report of the U. S. Geological Survey of the Territories, F. V. Hayden in charge, 1873 (1874), p. 474.—*Eumys* Leidy (name only), Proceedings Academy Philada. 1856, p. 90; loc. cit. 1857, p. 89; Extinct Mamm. Dakota and Nebraska, p. 342.

Dental formula: I. $\frac{1}{1}$; C. $\frac{0}{0}$; M. $\frac{3}{3}$. Crowns of the superior molars supporting two external cones, and two internal tubercles of crescentic section which communicate with the former by transverse ridges. Inferior molars of similar constitution, but reversed, the conic tubercles being interior and the crescentic exterior. The posterior tubercles of the posterior molars reduced, and an additional one on the anterior extremity of the first molar. Superciliary ridges none, but the supraorbital borders converging towards the middle line, and meeting above the postorbital region. No indication of postfrontal processes. Infraorbital foramen rather large above, terminating below in a vertical fissure. Incisive foramen entering the maxillery bone extensively. Incisor teeth not grooved.

I only know this genus from the cranium anterior to the pterygoid region, the mandibles, and the dentition. These parts display the characters of the *Muridæ*, and in particular of the existing genus *Hesperomys*. The only character which I can find which has enabled me to distinguish *Eumys* from the latter genus is the extension upwards of the orbital fossæ so as to form an interorbital crest. In none of the Sigmodont genera of North America are the supraorbital borders contracted in this way, but the crest is seen in *Fiber* and in various degrees in the genus *Arvicola*, being as distinct as in *Eumys* in *A. xanthognathus.**

A single species is certainly referrible to this genus, the *E. elegans*, which was abundant during the White River Miocene epoch. I have referred to the same genus a second species, in which the same characters are seen in the inferior molars; but as the frontal region is unknown, the reference was provisional only. This is the *Hesperomys loxodon** Cope, of the Loup Fork Miocene of New Mexico, a much smaller species than the *E. elegans.*

The typical species was originally described by Leidy, who gave it the generic name which I have adopted; but he at no time characterized the genus, or showed how it differed from others already known. This was first done by myself as above cited.

HESPEROMYS Waterhouse.

This recent genus had a representative in the Miocene period in North America, so far as the characters of the skull and dentition may be considered to be conclusive in evidence. It is not very probable that the indications thus obtained will be invalidated by other portions of the skeleton.

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* See Coues, U. S. Geol. Surv. Terrs. XI, Pl. IV, fig. 54.

The molars are $\frac{3}{3}$, and the crowns support alternating tubercles separated by shallow open transverse valleys. These are, one on the inner and two on the outer sides of the superior series, and one on the outer and two on the inner side of the inferior. In the recent species, (*H. leucopus*) there are two inflections on the inner side of the first molar, but in the species here described that tooth is constricted at the position of the anterior internal loop, and does not regain its width, but continues narrowed to the anterior extremity. The infraorbital foramen is rather large.

It is probable that there is a second species of this genus in the Loup Fork beds besides the *H. loxodon* Cope.

PACICULUS Cope.

Paleontological Bulletin No. 31, p. 2, Dec. 24, 1879; Proceedings American Philosoph. Society, 1879 (1880), p. 371.

Superior molars three, rooted. Enamel forming three entrant loops on the external face of the crown, and one on the internal face.

While the number of the superior molars of *Paciculus* is as in the *Muridæ*, the details of their structure is much as in *Dasyprocta* and *Fiber*. Two species are known.

In the *P. lockingtonianus* the cranial characters are as follows: The infraorbital foramen is very large, with a general triangular outline. The superciliary borders and temporal ridges are well separated, and there is no sagittal crest. There are no postorbital processes. The otic bullæ are large, and furnished with a very large meatus auditorius externus. The malar is a narrow bone extending to the glenoid cavity posteriorly, and resting anteriorly on a prominent peduncle composed of the maxillary bone. It probably reaches the lachrymal.

This genus is probably one of the *Muridæ*, and a near ally of *Sigmodon* and *Neotoma*. It differs from these genera in having three external inflections of the enamel in the superior molars instead of two. It differs from *Hesperomys* as these two genera do, viz, in having deep enamel inflections instead of tubercles and valleys. It is true that the deepening and narrowing of the valleys of the molars of *Hesperomys* would result after wear in a pattern like that of *Neotoma*. The same process in *Eumys* would produce a pattern much the same as that of *Paciculus*, but that genus is further characterized by the contraction of the postorbital region and the production of a sagittal crest.

Two species of this genus are known to me, *P. insolitus*, a smaller, and *P. lockingtonianus*, a larger one. Both are from the Truckee beds of Oregon. They demonstrate an early origin for the American type of *Neotoma*, as contemporaries of the first of the *Hesperomys*.

ENTOPTYCHUS Cope.

Paleontological Bulletin No. 30, p. 2, December 3, 1878; Proceedings American Philosophical Society, 1878 and 1879, p. 64.

Family *Saccomyidæ*.* The cranium is elongate, and presents inflated periotic bones, and slender zygoma. The foramen infraorbitale is small and anterior in position, entering the maxillary bone near its suture with the premaxillary.

Generic characters.—Molars $\frac{4}{4}-\frac{4}{4}$, rootless, and identical in structure. The crowns are prismatic, and in the young stage present a deep inflection of enamel from one side, the external in the superior teeth, the internal in the inferior. After a little attrition, the connection with the external enamel layer disappears, and there remains a median transverse fossette, entirely inclosed by enamel. The tooth then consists of two dentinal columns in one cylinder of enamel, separated by a transverse enamel-bordered tube. Incisors not sulcate.

The teeth of this genus differ from those of *Perognathus* in being without distinct roots, and in having the enamel loop cut off and inclosed. In *Dipodomys*, the molars are undivided simple prisms.

The skull is compact, and does not display the vacuities or large foramina seen in some genera of *Rodentia*. The incisive foramina are rather small and posterior in position. There is a foramen on the side of the alisphenoid, which is nearly in the position of the anterior alisphenoid canal of the *Thomomys bulbivorus*. The foramen rotundum is immediately below and within the anterior part of the glenoid cavity. The foramen ovale is not distinct from the foramen lacerum anterius, and is on the external side of the apex of the petrous bone. The other *foramina lacera* are closed, so that the carotid foramen pierces the inner side of the otic bullæ. The condyloid foramen is close to the occipital condyle. The meatus auditorius externus is at the extremity of a tubular elongation of the bulla, and is separated by a space from the zygomatic process of the squamosal bone. Between the bases of these is a fossa which is bounded above by a ridge as in the genus *Castor*. Below this ridge is a subsquamosal foramen, and above it a postsquamosal. There are no postpareitals nor mastoïd foramina.

There are deep pterygoid fossæ, whose inner bounding laminæ unite on the middle of the palatine border, and whose external laminæ are continuous with the posterior extremity of the maxillary bone. The otic bullæ are not separated very distinctly from the mastoid. The latter looks like a continuation of the former, as in *Thomomys*, and occupies considerable space between the exoccipital and the squamosal. The latter sends downwards a process just posterior to the auricular meatus, which forms the handle to a hammer-shaped laminar bone. This is, no doubt, a dismemberment of the squamosal, as a similar process is continuous with that bone in *Thomomys*, and one somewhat different is seen in *Neotoma*, *Hesperomys*, &c. Supraoccipital distinct on superior face of skull. Paroccipital process small or none. Mastoid elongate, adherent to otic tube. No postfrontal process.

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* *Geomyidæ* Alston.

A well-marked character which distinguishes the skull of this genus from *Thomomys*, *Dipodomys*, &c., is the separation of the meatal tube of the otic bulla from the zygomatic process of the squamosal bone by an interspace. There is no postsquamosal foramen in the recent genera. In *Dipodomys* the otic bulla is more largely developed, but it has the anterior bottle-neck prolongation seen in *Entoptychus*.

In the mandible the coronoid process is developed, but is not large It is well anterior to the condyle, which it somewhat exceeds in height The incisive aveolus forms a convexity on the outer side below the coronoid process. The angle is prominent, and is at first incurved below, and then turned outwards at the apex. The degree of obliquity of the grinding surfaces of the molar teeth vary with the species.

Parts of several skeletons are in my collection, but I cannot attach them to any cranium. They present the general characters of the genus *Thomomys* so far as they go. I describe some bones which apparently belong to one individual. The sacral vertebræ carry neural spines. There was evidently a well-developed tail. The scapula has a narrow glenoid cavity ending in a tuberosity adjacent to the coracoid hook. The spine is robust, terminating in a stout acromion. The tuberosities of the humerus are situated below the head, and are so rounded off as to be little prominent. One side of the greater is continued into a very prominent deltoid crest, which terminates abruptly below. The ilium has a narrow trilateral neck, and a projecting anterior inferior spine. The pubis is directed posteriorly at the base. The femur is not elongate. Its trochanters are well-marked, including a third. This is wanting in *Thomomys bulbivorus*. The neck rises obliquely to the rather large head. The condyles are short and spreading, and the rotular groove is short and rather wide, and with well-marked ridges. The tibia is much curved backwards at the proximal part. The crest is acute and is directed outwards, but does not project much at the head.

Individuals of this genus were very abundant in Oregon during the middle Miocene epoch. They represent several species, but how many it is difficult to determine. The most noteworthy variations are found in the development of superciliary ridges; then there are modifications in the forms of the premolar teeth, differences in the length and width of the muzzle, and some range in dimensions.

The following table represents the characters of the species so far as I can determine them at present:

A. Thickened superciliary ridges wanting; front wide.
    Superciliary borders obtuse, not continued into temporal ridges; front flat, or or little concave; premolars narrow.
        Length of skull .046 .... *E. planifrons*.
        Length of skull .038 .... *E. minor*.

Superciliary borders sharp, vertical, continued into two straight temporal angles, which form a V.
Premolars narrow; size of *E. planifrons* .... *E. lambdoideus.*
AA. Thickened ridge on the superior side of each supercilium; front narrower.
Superciliary ridges soon discontinued; size of *E. planifrons* ...... *E. cavifrons.*
AAA. Superciliary ridges much thickened, soon uniting, and closing the frontal groove behind. Front narrowest.
Premolar widened at the base; size of *E. planifrons* .... *E. crassiramis.*

Some differences in the form of the mastoid bone may be observed in species of this genus. Thus it is flat behind, and bears a well-marked "lateral occipital" angle in *E. planifrons* and *E. lambdoideus*, while in the remaining species it is convex, and with the angle little apparent. In some specimens the loss of the hammer-shaped squamosal dismemberment, which I will call the posttympanic bone, gives a deceptive extension forwards to the mastoid.

Parts of more than a hundred individuals of *Entoptychus* are in my collection.

PLEUROLICUS Cope.

Paleontological Bulletin, No. 30, p. 3, December, 1878; Proceedings Amer. Philosoph. Society, 1878 (1879), p. 66.

Family *Saccomyidæ*. Superior molars rooted and short-crowned. The crowns with a lateral fissure bordered with an inflection of the enamel sheath, extending to their bases. In the superior molars this inflection is on the external side, and does not divide the crown. Superior incisors not grooved.

This genus is curiously near to the existing *Heteromys* and *Perognathus*, the two genera of *Saccomyidæ* with rooted molars. The former differs in having the molars divided into two columns, each of which is sheathed in enamel, while *Perognathus* only differs, so far as I am aware, in having the superior incisors grooved. It is also very nearly related to *Entoptychus*, and two of the species correspond in various respects with two of those of that genus. In view of the fact that most of the specimens of the *P. sulcifrons* are old individuals with well worn molars, the idea occurred to me that the rooted character of the molars might be common to the species of *Entoptychus*, but that it might not appear until long use had worn away most of the crown, and the protrusion had ceased. Examination of the bases of the long molars of *E. planifrons* did not reveal any roots. It is also opposed to this view that the maxillary bone in the *Pleurolici* has little depth below the orbital fossa, appropriately to the short-rooted molars, while the depth is considerable in the typical *Entoptychi*, though there is a complete gradation in this respect. But I have demonstrated satisfactorily that *Pleurolicus* is a distinct genus by observations on the *P. leptophrys*. Some of my individuals of this species are young, with the crowns of the molars little worn, yet the roots diverge immediately on entering the alveolus, on all the molars. In the species of *Pleurolicus* the lateral fissure of the crown descends to its base, and hence persists longer than in the typical *Entoptychi.*

I am acquainted with two species of this genus. The posterior part of the skull of an individual represents a third species, which I refer provisionally to this genus.

The characters of the species are as follows:

I. Otic and mastoid bullæ continuous.
  Temporal ridges uniting into a sagittal crest; length of skull .043; supraorbital ridges and concave front..*P. sulcifrons.*
  Temporal ridges not uniting; length of skull .035; interorbital region flat; no ridges..*P. leptophrys.*
II. Otic and mastoid bullæ separated by a deep groove.
  Temporal ridges not united; front concave; size medium; supraoccipital wide..*P. diplophysus.*

LAGOMORPHA.

PALAEOLAGUS Leidy.

Proceedings Academy Philada. 1856, p. 89; Extinct Mamm. Dakota and Nebraska, p. 331.—Cope, Ann. Report U. S. Geol. Survey Terrs. 1873 (1874), p. 477.

Family *Leporidæ.* Dentition: I. $\frac{2}{1}$; C. $\frac{0}{0}$; M. $\frac{6}{5}$; or, Pm. $\frac{3}{2}$, M. $\frac{3}{3}$. Superior incisors sulcate, inferior incisors not sulcate. First and last superior molars simple, intermediate ones with an enamel inflection of the inner side, which soon wears out. First inferior molar of one more or less transversely divided column; other inferior molars consisting of two columns in antero-posterior relation. No postfrontal process.

The above characters approximate nearly those of the existing genus *Lepus.* The only distinction between them signalized by Dr. Leidy, is the more simple first inferior molar of the extinct genus, which consists of one column more or less divided. In *Lepus* this tooth consists of two columns, the anterior of which is grooved again on the external side in the known species. I am able to reinforce this distinction by a strong character, viz, the absence of the postfrontal process in *Palæolagus.*. As compared with the extinct genus *Titanomys* of Meyer,* the difference is well marked, as that genus has the molar teeth $\frac{5}{4}$ instead of $\frac{6}{5}$. The last inferior molar is cylindric, consisting of but one column. The first inferior molar consists of two cylinders broadly united, as in the corresponding tooth of *Palaeolagus.* As compared with *Panolax* Cope,† which is only known from superior molar teeth, this genus may be at once recognized by the simplicity of the last tooth. In *Panolax* it consists of two columns.

Dr. Leidy's descriptions and figures, which are available for the definition of this genus, relate exclusively to the dentition. Characters drawn from the skeleton generally can be derived from my material and are now given.

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* *Amphilagus.* Catal. Méth. et Descr. Vertèbres Fossiles de la Bassin de la Loire, 1853, p. 42.

† Report Lieut. G. M. Wheeler, 4 to, IV, p. 296.

The nasal bones are wide, and the suture which separates them both from the frontal is concave forwards. The median frontal suture is persistent. The ascending portion of the premaxillary, which attains the frontal, is very narrow. The superior half of the facial plate of the maxillary bone is sharply rugose with reticulate ridges, but whether perforate or not I cannot certainly determine. The *foramen infraorbitale* is small and round, and issues below the reticulate portion of the maxillary. The otic bulla is compressed globular, with very thin walls. The meatus is large and has prominent lips, which open upwards. The mastoid is coössified with the bulla, and extends with a dense surface from behind to above and in front of the meatus. The incisive foramina are very large, enter the maxillary bones deeply, and are confluent posteriorly. The palate may be said to extend to the last molar, but there is a deep though narrow median posterior emargination.

The distal extremity of the *humerus* is not so extended transversely as in *Ischyromys*, and exhibits a moderate epicondyle. The inner flange of the condyles is well developed, and on the posterior face it is supplemented by a flange of the external edge of the condyles, which is as prominent or even more so, forming an intertrochlear crest. The arterial canal is inclosed by a slender bridge, and opens on the inner side above, and anteriorly below. In an ulna supposed to belong to this genus the coronoid process is elevated. The radial facet forms a narrow transverse plane, nearly divided by a wide anterior emargination. The shaft is compressed vertico-obliquely. A radius exhibits a transversely oval humeral face of the head somewhat angulate at a superior and an infero-lateral extremity, which are diagonally opposed to each other. Beyond the middle the shaft becomes wider, and is flattened obliquely.

The peduncle of the *ilium* has a triangular section, the anterior face being the narrowest, and inclined at a little more than a right angle to the interior face. It expands but little at the sacral extremity, and the crest is very short. The external angle of the peduncle is very prominent and runs into the anterior extremity of the crest, from which proceeds also the more obtuse angle which is continuous with the pectineal line. A third longitudinal angle is seen on the middle of the external side of the sacral extremity, which is not continued on the peduncle. There is a prominent tuberosity on the median or first-described angle, on the peduncle which may or may not be homologous with the anterior inferior spine. There is no tuberosity on the inner bounding angle of the inner face as is seen in *Gymnoptychus*. The pubis leaves the ilium at right angles. Acetabulum nearly round.

The *femur* has well developed great and little trochanters, and a third trochanter, which rises from the shaft in line with the inferior border of the little trochanter. The fossa of the great trochanter is well marked. The head is not separated from the great trochanter by a deep emargination, and projects well within the internal face of the shaft. Its articular surface is prolonged towards the great trochanter. *Fossa ligamenti teris* isolated. The distal extremity of the femur exhibits the superiorly prolonged patellar groove characteristic of this group of rodents. The condyles are more than elsewhere produced downwards and posteriorly, and are well separated.

The spine of the *tibia* is rudimental, and the crest is very obtuse. The inferior continuation of the latter forms a prominent reverted keel on the proximal front of the shaft, which is deeply concave on its inner side. The posterior face is also concave and is separated by a laminar external bone from the external side. The external border of the head is not deeply notched as in *Panolax*. The fibula unites with the tibia on the proximal part of the latter. The remainder of the shaft is smooth. The external malleolus is large and at right angles to the long diameter of the distal end of the bone, and its extremity is a facet for contact with the calcaneum. On its external face is a prominent process directed backwards. The external trochlear groove is deeper than the internal, and is well separated from it. The internal malleolus can scarcely be said to exist. It may be represented by a small process on the inner side of the extremity of the shaft.

The *astragalus* is elongate and flat, and the trochlear portion is oblique. The neck is elongate, and convex on the inner side; the constriction is on the inner side immediately behind the head. The long diameter of the latter makes an angle of 45° with the horizontal plane. The external trochlear arc is much larger than the internal. The cotylus, which fits the external condyle of the calcaneum, posesses a peculiar impressed area on its posterior surface. The calcaneum extends nearly as far anterior to its condyle as posterior. The free portion is subcylindric or subquadrate to the end. The internal process for the astragalus is quite prominent. The cuboid facet is directed obliquely inwards, running into a short longitudinal groove. The cuboid extremity is little depressed.

The skeletal characters above enumerated were taken from the bones of *P. turgidus* and *P. haydeni*, excepting in the cases of the ulna, radius, ilium, and calcaneum, which were derived from those of *P. haydeni* only.

A cast of the cranial chamber of a specimen of *Palaeolagus haydeni* displays the superficial characters of the *brain*. As in the order generally, the hemispheres are small and are contracted anteriorly. The greater part of the cast of the cerebellum is lost, but enough remains to show that it was large. The olfactory lobes are large; they are not gradually contracted to the hemispheres, but expand abruptly in front of them, being separated by a constriction only. They are wider than long, and than the anterior extremity of the hemispheres. Their cribriform surface is wide, and extends backwards on the outer sides. Traces of the three longitudinal convolutions can be observed on the hemispheres above the *lobus hippocampi*. The internal and median are continuous at both extremities, and extend with the external to the base of the olfactory lobes. There is no definite indication of the Sylvian fissure. The *lobus hippocampi* protrudes laterally a little beyond the border of the external convolution. Its form is depressed.

As compared with the brain of the rabbit (*Lepus cuniculus*) figured by Leuret and Gratiolet[*], that of the *Palaeolagus haydeni* is distinguished by the absolutely much smaller size of the hemispheres, and by the absolutely larger olfactory lobes, the excess being in transverse dimensions and not in the longitudinal. An important difference is also the absence of the median posterior production of the hemispheres seen in the rabbit, the prolongation in the extinct species being lateral, and extending little behind the *lobus hippocampi*. The indications of the convolutions of the superior surface are similar in the two.

As observed by Leidy, this genus presents the same number of teeth as in the existing rabbits, viz, I. $\frac{2}{1}$; C. $\frac{0}{0}$; M. $\frac{6}{5}$; and that the difference consists in the fact that the first molar possesses two columns, while in *Lepus* there are three. Having collected a great number of remains of this genus, I am able to show that it is only in the immature state of the first molar that it exhibits a double column, and that in the fully adult animal it consists of a single column with a groove on its external face. The dentition undergoes other still more important changes with progressing age, so as to present the appearance of difference of species at different periods. These will be explained under the head of the *P. hvydeni*, the most abundantly represented in the collections. It may be mentioned here that in neither *P. haydeni* nor *P. turgidus* is there any evidence that more than two anterior molars are preceded by deciduous teeth. The latter are present in many specimens.

Four species of this genus are known to have lived in Colorado during the White River epoch of the Miocene. Bones of two of the species have been found also in Dakota. The *P. haydeni* was probably the most abundant mammal of the fauna of that period.

Depth of ramus at penultimate molar, 6^{mm}; length of inferior molar series, 10^{mm}; no third lobe to molars.................................... *P. agapetillus.*
Depth of ramus at penultimate molar, 9^{mm}; length of molar series, 10^{mm}; no third lobe to molars .... *P. haydeni.*
Depth of ramus at penultimate molar, 11^{mm}; length of tooth series, 14^{mm}; a third posterior lobe of the molars.................................... *P. triplex.*
Depth of ramus at penultimate molar, 12–14^{mm}; length of tooth series, 13–16^{mm}; no third lobe.................................... *P. turgidus.*

LEPUS Linn.

Dental formula: I. $\frac{2}{1}$; C. $\frac{0}{0}$; P-m. $\frac{3}{2}$; M. $\frac{3}{3}$. First superior molar simple; first inferior molar with two external grooves; last inferior molars consisting of two cylinders. Postorbital processes present.

I am acquainted with but one extinct species of this genus, and this is from the Truckee or Middle Miocene period. It proves the ancient origin of this genus now so widely distributed over the earth. Species of *Lepus* are reported by the Gervais from the Miocene (Montabuzard) and Pliocene (Montpelier) of France.

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[*] Anatomie Comparée du Système Nerveux, Pl. III, Figs. 1, 2.

LEPUS ENNISIANUS Cope.

This species is abundant in the Miocene beds of the John Day River Oregon, associated with a species which I cannot distinguish from the *Palaeolagus haydeni*. The *Lepus ennisianus* exceeds the last-named species in dimensions, being intermediate between it and the *Palaeolagus turgidus*.

The form of the skull and character of the postorbital processes refer this species to the neighborhood of the *Lepus auduboni* and *L. bachmani*.* The former has the general outline of that of *Lepus sylvaticus*, with which it nearly agrees in size. The postorbital processes are free and shorter and narrower than those of the *L. auduboni*. The supraorbital notch is insignificant, and is not bounded by either an angle of the border or a process. Behind the postorbital processes the cranium is narrower. The parietal region is convex in both directions. The interorbital and base of the nasal region are flat. The middle of the superior part of the occipital projects table-like beyond the lateral portions, as in recent rabbits. The otic bulla is large and is flattend on the external side. The mastoid presents some subvertical grooves. The paroccipital process is rather short and is turned backwards at the apex.

The mandible has much the form of that of *L. sylvaticus*, with certain differences. A slight convexity of the anterior border of the ascending ramus is the only trace of coronoid process. The posterior border of the same projects very little behind the condyle, and is but slightly concave below that point. The inferior border of the masseteric fossa terminates below the anterior border of the base of the coronoid process, which is posterior to the corresponding position in *L. sylvaticus*. Here the masseteric fossa extends as far forwards as the line of the posterior part of the fourth inferior molar.

The superior molars have the form usual in this genus. The crowns are grooved on both the external and internal faces. The first has less transverse extent than the others (except the sixth), and has a shallow groove on the anterior face. The sixth molar is a small and simple cylinder. Of the inferior molars, the first has the greatest antero-posterior diameter, while the transverse is equal to that of the others. Of its external grooves the posterior is the strongest. The last molar is much the smallest, and its section is a figure 8, with the widest circle next to the fourth molar. The anterior column of the other molars wears so as to be higher than the posterior. Its inner edge carries a shallow groove, while the external edge is narrow and smooth, and their alveoli terminate in a swelling below the first molar (Pm. III). The groove of the superior incisors is nearer the internal than the external side. The inferior incisors are perfectly flat.

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*See Baird, Mammalia of the U. S., Pac. R. R. Surveys, VIII, p. 574.

Measurements.

	M.
Length of skull from inion to above Pm. II	.048
Length from inion to base of postorbital process (axial)	.032
Width of skull at glenoid cavities	.020
Width of skull behind bases of postorbital processes	.009
Vertical diameter of orbit	.0125
Depth of skull and mandible in place, at middle of orbit	.0310
Depth of mandible at condyle	.0310
Length of mandible to exit of incisor	.044
Depth of mandible at last molar	.011
Depth of mandible at middle of diastema	.005
Length of superior molar series	.012
Width of Pm. II (above)	.002
Width of M. I	.003
Length of inferior molar series	.013
Length of inferior Pm. III	.003

A fragmentary skeleton is associated with jaws and teeth of this species, and they are presumably parts of the same animal. They resemble the corresponding parts of *Lepus sylvaticus*, but are relatively smaller. The centrum of a lumbar vertebra is much depressed. There is a prominent anterior inferior spine of the ilium. On the internal side of the distal end of the tibia the ligamentous groove is more, and its bounding process is less, distinct than in *L. sylvaticus*.

Measurements.

		M.
Width of centrum of lumbar vertebra		.0083
Depth of centrum of lumbar vertebra		.0040
Diameter of acetabulum		.0060
Diameters of head of tibia	anteroposterior	.011
	transverse	.0105
Diameter of distal end of tibia	anteroposterior	.0046
	transverse	.009
Length of free part of calcaneum		.007

From the John Day River and the north fork of the John Day River, Oregon. C. H. Sternberg.

This rabbit is the oldest species which can be referred to the genus *Lepus*. It is dedicated to my friend Prof. Jacob Ennis, of Philadelphia, the distinguished mathematician and physicist.

Art. XVI.—On the Canidæ of the Loup Fork Epoch.

By E. D. Cope.

In the sixth volume of the Bulletin of the Survey, commencing at page 177, I gave an account of the *Canidæ* of the White River period, in its two subdivisions, the White River and Truckee epochs. Fourteen species were enumerated. At present I give a brief review of some of the species of the succeeding or Loup Fork formation, whose age I have placed as the highest Miocene. The number of species is not so large as that found in the preceding period, and those that are known approach more nearly in character the existing dogs. Some of them exceed in size any of those of the other period, and none are so small as the least of the White River forms.

Dr. Leidy has described the *Canes haydeni*, *saevus*, *temerarius* and *vafer*, and I have added *Canes ursinus* and *wheelerianus*, and *Tomarctus brevirostris*.

Dr. Leidy also described an *Ælurodon ferox*, whose affinities he did not decide, but which he thought to combine characters of dogs and cats. I am able to prove by material now in my possession, that the *Ælurodon ferox* and the *Canis sævus* are the same species. The genus *Ælurodon* must be added to the *Canidæ*, and distinguished from *Canis* proper only by the presence of an anterior cutting lobe of the superior sectorial tooth, the character on which Dr. Leidy originally proposed it. There are three species of the genus known to me, the *Æ. saevus*, *Æ. wheelerianus* (*Canis* Cope), and a new one which I propose shall be called *Æ. hyænoides*. The character of the superior sectorial tooth above mentioned is as much like that of *Hyæna* as *Felis*, and the entire tooth in the *Æ. hyænoides* is much like that of the former genus. In all three species the premolars are very robust, as though to aid the sectorials in crushing bones, as they do in the hyænas. The second metacarpal bone has on its inner surface a rough area of insertion, such as is present in the dogs and absent in the hyænas, and which may indicate five digits in the anterior foot, the general character of the *Canidæ*.

ÆLURODON SAEVUS Leidy.

> *Canis saevus* Leidy, Proceed. Acad. Phila.. 1858, p. 21.—*Ælurodon ferox* Leidy, l. c., 1858, p. 22; Extinct Mammalia Dakota and Nebraska, Plate I, Figs. 9 and 13, 14.

I have a large part of the skeleton, with entire skull, of an individual of this species, and part of the skull and dentition of a second. The characters may be briefly given as follows:

Muzzle narrow and short, with small incisor and canine teeth; inner anterior basal lobe of superior sectorial very small. First tubercular very large, subtriangular. Mandibular ramus shallow; the external face not divided into two planes. Masseteric fossa less defined below.

ÆLURODON WHEELERIANUS Cope.

Canis wheelerianus Cope, Report Explor. Surveys W. of 100th Mer., Lieut. G. M. Wheeler, IV, pt. ii, p. 302, Pl. LXIX, Fig. 2.

This species was abundant in Nebraska, though originally discovered in New Mexico in the Loup Fork beds. It is a more robust animal than the *C. saevus*, and differs in various details. The skull was of about the same size, viz., rather shorter, but stouter than that of the *Canis lupus*. The characters are as follows:

Muzzle longer; canine teeth large; external superior incisor nearly as large at base of crown as canine. Anterior inner lobe of superior sectorial well marked. Mandibular ramus deeper and thicker, the external face in two planes, separated by a rounded angle.

One of the marked characters of this dog is the very large third superior incisor. In *Æ. saevus* it is much smaller than the canine as in most *Canidæ*.

ÆLURODON HYÆNOIDES sp. nov.

This dog is indicated by a fragment of the skull which includes the right premaxillary, maxillary, and most of the malar bones, coössified. The alveoli of all the teeth, except the I. 1, are present, and crowns of all the molars, excepting the Pm. I and M. II. The animal is adult, and rather aged.

The external incisive alveolus is large, but not equal to that of the canine. The latter is rather large, while that of the first premolar is small. The second and third premolars are robust, and somewhat swollen at the inner base. Each has a short heel but no median posterior lobe. The principal lobe is robust, in the third molar as wide as long at the base. The internal anterior lobe of the superior incisor is very large, and its apex is distinct from the inner side of the rest of the tooth. It is relatively larger than in the *Crocuta brunnea*. The anterior lobe is well developed, but does not project so far as the other lobes. The first true molar is somewhat wider near the inner extremity of the crown than at the external extremity. The two external tubercles are not prominent nor well distinguished at the base from the ledge-like external cingulum. The alveolus of the second molar indicates a medium-sized tooth, and its anterior borders turned posteriorly so that the long axis is directed as much backwards as inwards. Enamel entirely smooth.

The muzzle was of medium length. The malar bone has a prominent acute postorbital process. The orbit was relatively as large as in the wolf. The external infraorbital foramen is relatively and absolutely large, and issues above the anterior border of the superior sectorial tooth.

Measurements.

	M.
Length of entire superior dental series on middle line of palate	.067
Length of molar series	.045
Length of alveolus of canine	.010
Length of premolar series	.034
Length of sectorial or base of crown	.013
Width of sectorial in front	.010
Length of first true molar externally	.008
Width of first true molar externally	.013

From the preceding it is evident that the *Ælurodon hyænoides* differs from the two other species of the genus in its inferior size, the relatively smaller tubercular molars, which are wider interiorly, and the much larger internal anterior lobe of the superior sectorial.

The specimen on which it rests was found in Southern Nebraska by Mr. R. H. Hazard.

CANIS BRACHYPUS sp. nov.

This dog is represented by a considerable part of a skeleton, with skull, in a moderately good state of preservation. Both superior sectorial teeth are wanting, as well as most of the dorsal vertebræ and the humeri, femora, and tibiæ. Some metacarpals and metatarsals with an astragalus and some phalanges, give characters of the feet. The size of the species is about that of the *Canis latrans*.

As compared with the coyote, the prominent marks of distinction are the small sectorial teeth, the elevated sagittal crest, and the small feet. The sectorials have the character I have already ascribed to the sectorials of all the older carnivora, including the dogs of the Lower Miocene, and which has since been expressed by Huxley in the term "microdont." It prevails also among the dogs of the Loup Fork epoch, although the species of *Ælurodon* may be regarded as exceptions. The sagittal crest commences at a point above the anterior border of the glenoid surface, and extends posteriorly to above the foramen magnum. It is quite elevated and thin. The astragalus is well grooved, and, while as wide, is a little longer than that of the *Canis latrans*. The third metacarpal is one-fourth shorter than that of *C. latrans*, and the fifth metatarsal one-fifth shorter than the corresponding bone of *C. latrans*.

The length of the pelvis is equal to that of the ramus of the mandible, and is as large as the average of that of those of *C. latrans*. The cervical vertebræ are about the size of those of the same species, and are not so much depressed. The crest of the axis is considerably higher, and extends well fore and aft. The otic bullæ are not very large, but are much swollen. The paroccipital processes are well developed, and project backwards nearly as far as the posterior face of the occipital condyles. They are connected with the otic bullæ by a plate of bone, which, with the process, is larger than that of the wolf. In this respect this species differs from all the Truckee and White River species, where the paroccipital process is either in contact with the bulla or little separated from it. The mandibular rami are moderately robust, and the masseteric fossa extends to the line of the posterior border of the first tubercular tooth. The coronoid process is large and obtuse above. The angle is prominent.

Measurements.

		M.
Length of skull (axial)		.196
Length of superior dental series		.092
Length of inferior dental series		.097
Length of inferior premolars		.049
Length of inferior sectorial base		.019
Elevation of inferior sectorial from base		.011
Length of mandibular ramus		.148
Elevation of ditto at coronoid		.060
Elevation of ditto at sectorial		.030
Length of axis with odontoid		.044
Length of remaining cervicals		.119
Length of lumbar vertebra		.028
Elevation of lumbar vertebra		.045
Diameters centrum do.	vertical	.013
	transverse	.021
Depth of pelvis at obturator foramen, obliquely		.049
Diameter of acetabulum		.019
Length of third metacarpal		.048
Length of astragalus		.028
Length of fifth metatarsal		.062

The fine specimen which is above described was discovered by my assistant, J. C. Isaac, in a sandy bed of the Ticholeptus division of the Loup Fork formation. This, as I have elsewhere shown, is lower in position than the True Loup Fork. The locality is near Laramie Peak, Wyoming Territory.

Art. XVII.—On a Crayfish from the Lower Tertiary beds of Western Wyoming.

By A. S. Packard, Jr.

The discovery of two well preserved specimens of crayfish from the Lower Tertiary beds of the western border of Wyoming Territory is notable from the fact that while fossil crayfishes of the Cretaceous and of probable Pliocene age were known, hitherto none have been found in the Lower Tertiary deposits. The locality from which the specimens were brought is the fish beds of the Bear River Valley, situated from 75 to 100 miles a little west of north of Evanston, Wyo., and near the Utah line. These beds are rich in fine specimens of fossil fishes, including a skate, which have been described by Professor Cope. They are apparently much less rich in insect and plant life than the Green River beds at Green River City, Wyo.

For the opportunity of examining and describing* these interesting remains I am indebted to Prof. Joseph Leidy, who received them as a loan from Dr. J. Van A. Carter, of Evanston, Wyo., in whose possession they now are.

The two specimens are tolerably preserved; the smaller one presents a dorsal view, and the larger a lateral view, though both have been somewhat distorted, flattened, or compressed by pressure. The length of the smaller specimen from the tip of the rostrum to the end of the telson is 38^{mm}; of the larger individual, 53^{mm}.

The internal layer of the cornea of one eye in the larger individual is preserved and is black, and of the size usual with living species of the genus, but no marks of the facets are visible; the diameter of the eye through the cornea is 3^{mm}.

The first (and smaller) antennæ in the small specimen show that they are much as in the species of *Cambarus*, the two distal joints of the scape appearing, however, rather thicker, probably owing to being flattened by pressure. The flagellum (but one branch is visible) is of the usual length and thickness. Length of the flagellum in the smaller specimen, 5^{mm}; in the larger, 8^{mm}.

The second antennæ are of the usual size; the last joint of the scape of

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* A preliminary description of these fossils was published in the *American Naturalist* for March, 1880, vol. xiv, p. 222.

the same size as in *Cambarus;* the flagellum is of the same size, extending to the terminal fourth of the abdomen, *i. e.*, quite to the base of the penultimate abdominal segment. Length of flagellum in the large example, 44^{mm}.

The scale (exopodite) of the second antennæ (Fig. 1) is quite similar in form to that of *Cambarus obesus* var. *latimanus* and *C. bartonii*, but rather narrower, the terminal spine being long and slender, acute; the thin edge, blade, or expansion being narrow, and with the edge gradually narrowing towards the spine, much more so than in *C. obesus* or *bartonii*. The scale has several impressed lines as seen in the living individuals of *Astacus* and *Cambarus*. The upper edge of the scale has a row of pits, corresponding to the little tubercles for the insertion of the spinules in the living species. The length of the scale is 7^{mm}, and the breadth 2^{mm}.

The end of the third joint of the first antennal scape in the smaller specimen reaches to near the end of the last joint of the second antennal scape, though these parts are somewhat misplaced; still in this respect the species is more like those of *Cambarus* than of *Astacus*, in which (*A. fluviatilis*, from Europe) I observe that the joints of the scape are very much shorter than in *Cambarus*, and that the end of the scape does not reach beyond the end of the penultimate joint of the second antennal scape.

Rostrum.—The shape of the rostrum can fortunately in the smaller example be made out tolerably well. Its general shape is much as in *Cambarus affinis*, but it is a little narrower, the frontal spine being unusually long and narrow. The two lateral spines are present and are situated about one-half way between the base of the rostrum and its long slender acute tip. This relation is unusual, as in *C. affinis*, the tip is much shorter and the lateral spines are situated near the tip. The edges of the rostrum are raised; the lateral spines at the base, so well developed in the living species, are in these fossils obscurely marked on one side, owing probably to the distortion of the carapace. Length of rostrum, 7^{mm}; breadth, 3^{mm}.

Carapace.—The transverse curved line of the carapace (cervical groove of Huxley) is as usual in living *Cambari*, and there are indications of the lateral spines. The surface is irregularly and finely pitted as in most *Cambari*. Length (in the smallest and best preserved specimen) of carapace, 18^{mm}; breadth of posterior edge, 12^{mm}.

The mouth-parts are not indicated, and the branchiæ cannot be detected so as to ascertain how many pairs there are, and whether the species belongs to *Astacus* or *Cambarus*.

The first, largest pair of legs, are rather shorter and stouter than in living *Cambari*, the chela is moderately broad, and of much the same proportions as in *C. affinis*, but the pincers (propodite and dactylopodite) are rather shorter and stouter, and the surface of the chela and of the whole limb is much more coarsely tuberculate, being in this respect somewhat as in *Astacus fluviatilis* of Europe. The third joint from the end (carpopodite) appears to be somewhat shorter than in *Cambarus*. Length of chela in the larger example (partly estimated) 19^{mm}; breadth, 8^{mm}; length of carpopodite, 5^{mm}; breadth, 6^{mm}; meropodite, 10^{mm}; breadth, $6\frac{3}{8}^{mm}$.

The other pairs of legs are moderately stout and heavily tuberculated and spined, more so than even in large adult specimens of *Astacus fluviatilis*, which is more coarsely tuberculated than in any species of *Cambarus* which we have seen.

Abdomen.—Of the usual proportion, but the surface is rougher than usual, more so than in *Astacus fluviatilis*. The telson and the four rami of the last pair of abdominal legs are of the same proportions and spined in the same manner as in *Cambarus;* the lateral spines of the telson are stout, proportionately more so than in a specimen of *C. affinis* twice its size. The shape of the broad rami is the same as in most, if not all, the species of *Cambarus;* the straight line of small spines near the end of the exopodite being well marked. Length of abdomen in the small specimen, 18^{mm}; breadth of the third segment, $9\frac{1}{2}^{mm}$; length of telson, 4^{mm}; breadth at base, 4^{mm}. No traces of the abdominal appendages (except the last pair just described) are to be seen.

As to the generic relationship of this species we must remain in doubt until the discovery of additional specimens enables us to determine the number of branchiæ, the species of *Astacus* having eighteen, and that of *Cambarus* having seventeen, the last pleurobranchia wanting in the latter genus.

The species of *Cambarus*, as is well known, are not found west of the Rocky Mountains, the genus on the Pacific coast being replaced by *Astacus*, thus presenting an interesting analogy to the European fauna. Now whether the Green River and Bear Lake beds contained a fauna more analogous to the Atlantic or Pacific slope is as yet unknown.

However, judging from the form of the scape of the second antennæ, the tertiary species in question is apparently more closely allied to *Cambarus* than to *Astacus*, though the first pair of legs are rather shorter and stouter than in *Cambarus*, and the body more coarsely tuberculated, while in the large numerous tubercles it resembles *Astacus*.

Of all the species of *Cambarus*, judging by our specimens and the figures in Hagen's Monograph; in the shape of the rostrum, the form of the chelæ and antennal scale it approaches most closely to *Cambarus affinis*. This is an interesting point, since it is evident, as Mr. Uhler originally pointed out to us, and as we think seems quite evident, that *C. affinis* is the most generalized species of all our crayfishes, being apparently the ancestral form from which the other American species have descended or been thrown off.

We may in this connection refer to the three fossil forms from Idaho Territory, described* by Prof. E. D. Cope, who has kindly allowed us to examine his type specimens (those of *A. subgrundialis* excepted), which were collected by Mr. Clarence King, in charge of the Survey of the Fortieth Parallel. The three species are *Astacus subgrundialis*, from a fresh water deposit in the territory of Idaho, near Hot Spring Mountain, *Astacus chenoderma*, and *A. breviforceps* from Catharine's Creek, Idaho.

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* Proceedings Amer. Phil. Soc., 1870, p. 605, vol. xi, No. 85.

They are quite imperfect and are stained nearly black with iron, and present a very different appearance from the fossils of the Lower Tertiary (Eocene?) beds from which *Cambarus primævus* were obtained. The beds containing the Idaho specimens, according to Cope, were associated with fossil cyprinoid fishes (Proc. Amer. Phil. Soc., xi, p. 538), which were deposited in a fresh water basin, once a lake, which has, at a comparatively late period of geological time, been elevated and desiccated. Of the six genera of fishes described from these deposits "one of them, Semotilus, is recent, while three are closely allied to existing genera, viz, Rhabdofario, Anchybopsis, and Oligobelus. Distichus and Mylocyprinus are less nearly related to living genera."

"The molluscs of this formation have already been described by F. B. Meek, and they, like the fishes, determine it to be lacustrine and fresh, as already stated by Professor Newberry. The species are stated by Meek (Proc. Acad. Nat. Sc. Phil., 1870, 56) to be distinct specifically, and in some cases generically, from all others hitherto described from the West. Leidy observes (Proc. Acad. Nat. Sc. 1870, 67), that mammalian remains received from Captain King's expedition include portions of *Mastodon mirificus* and *Equus excelsus*, which indicate an age similar to that of the Bad Lands of the Niobrara, which Hayden calls Pliocene. The remains [of fishes] described in this paper furnish few means of determining the age of the deposit. There is, however, a great probability of their being later than Miocene, and nothing to conflict with their determination as of Pliocene age."

The fossil remains of two of the three species (I have not seen those of *Astacus subgrundialis* Cope) show that they had attained as great a size as the larger individuals of our existing species, and must have lived under the most favorable conditions and in fresh water.

It is impossible from the remains to ascertain whether they belong to the genus *Astacus* or *Cambarus*, as these specimens are very imperfect. *A. chenoderma* in the carapace and chela seems to approximate in size and form to *Astacus fluviatilis* of Europe, and it is not improbable that it is an *Astacus* rather than a *Cambarus*. That this is the case is rendered probable by the form of the tubercles at the base of the rostrum; but in the form of the carapace and the absence of the group of spines low down on the side of the carapace, which are also wanting in *Astacus fluviatilis* but present in *Cambarus affinis* (though absent in *C. bartonii*) the fossil forms are allied perhaps rather to *Cambarus*, but as these characters are inconstant in *Cambarus*, they may not prove much as to the generic affinities of the fossils. On the other hand, the rostrum is large, more triangularly ovate in the Idaho fossils, and the scale of the larger antennæ is longer than in living *Astaci* or *Cambari*. The rostrum of *A. breviforceps* is very long and acute.

C. primævus differs from *Astacus breviforceps* in the narrower chela, and in the larger tubercles of the surface. It differs from *A. chenoderma* in the different shape of the large chelæ, those of *A. chenoderma* being flatter and thinner, while the ornamentation or sculpturing is also different, the tubercles of the carapace and limbs being higher and more prominent in *C. primævus* than in either of the two Idaho species examined by me.

The Idaho *Astaci* being probably of more recent age than the Miocene, the *Cambarus primævus* is exceedingly interesting, from the fact that it represents a period in which heretofore no fossil crayfish has been found. The soft, fine, fissile, clayey shales of the Bear River tertiaries contain not only a good many herring-like fish, but also genuine skates. The presence of land plants mingled with marine animals, shows that the waters were fresh, but communicated with the sea; the conditions were apparently those of a deep estuary into which fresh water streams ran, and in these rivers lived the crayfish. The deposits were probably Eocene, if these divisions are to be retained for the Tertiary deposits of the West, and may have been laid down nearer the ocean than those of Green River. At any rate, it is safe to say that the *Cambarus primævus* existed in the Bear River basin in early Tertiary times (the Green River epoch), while the Idaho *Astaci* were of much later age, possibly of so-called Pliocene or the transition period which connected the Tertiary with the Quaternary period. The *Cambarus primævus* may therefore be regarded as probably an Eocene crayfish.

It thus appears that there is a tolerably complete set of forms of the modern type of crayfish, beginning with the Cretaceous period and extending through the Lower and Upper Tertiary, and culminating in the present assemblage of *Astaci* and *Cambari*, with allied forms peopling the cooler parts of the northern hemisphere.

It was the intention of the writer to examine into the geological succession of the crayfishes, but since the specimens were received for examination the excellent and thorough work of Professor Huxley, entitled "The Crayfish," has appeared, and his inquiries into the geological succession and probable genealogy of the existing crayfish completely cover the ground. We will condense the statements of Professor Huxley, in order that the reader may see the interest to be attached to the discovery of the Wyoming fossils.

While the shrimps or Macrura date back to the Carboniferous, being there represented by Anthrapalæmon, with, however, no special affinities to the *Astaci*, it is not until we ascend to the Middle Lias and strata belonging near the top of the Jurassic series that we find in the genus *Eryma*, of which some forty species have been recognized, a genus which is closely allied to *Astacus* and *Cambarus*. It was, however, a marine form, and no fresh-water types existed in the fresh-water beds of the

Wealden. "In the marine deposits of the Cretaceous epoch, however, astacomorphous forms, which are known by the generic names of *Hoploparia* and *Enoploclytia*, are abundant.

"The differences between these two genera, and between both and *Eryma*, are altogether insignificant from a broad morphological point of view. They appear to me to be of less importance than those which obtain between the different existing genera of crayfishes.

"*Hoploparia* is found in the London clay. It therefore extends beyond the bounds of the Mesozoic epoch into the older Tertiary. But when this genus is compared with the existing *Homarus* and *Nephrops*, it is found partly to resemble the one and partly the other. Thus, on one line, the actual series of forms which have succeeded one another from the Liassic epoch to the present day is such as must have existed if the common lobster and the Norway lobster are the descendants of Erymoid crustaceans which inhabited the seas of the Liassic epoch.

"Side by side with *Eryma*, in the lithographic slates, there is a genus, *Pseudastacus*, which, as its name implies, has an extraordinarily close resemblance to the crayfishes of the present day. Indeed there is no point of any importance in which (in the absence of any knowledge of the abdominal appendages in the males) it differs from them. On the other hand, in some features, as in the structure of the carapace, it differs from *Eryma*, much as the existing crayfishes differ from *Nephrops*. Thus in the latter part of the Jurassic epoch the *Astacine* type was already distinct from the Homarine type, though both were marine; and, since *Eryma* begins at least as early as the Middle Lias, it is possible that *Pseudastacus* goes back as far, and that the common protastacine form is to be sought in the Trias. *Pseudastacus* is found in the marine cretaceous rocks of the Lebanon, but has not yet been traced into the Tertiary formations.

"I am disposed to think that *Pseudastacus* is comparable to such a form as *Astacus nigrescens* rather than to any of the Parastacidæ, as I doubt the existence of the latter group at any time in northern latitudes.

"In the chalk of Westphalia (also a marine deposit) a single specimen of another Astacomorph has been discovered, which possesses an especial interest as it is a true *Astacus* (*A. politus* von der Marck and Schluter), provided with the characteristic transversely divided telson which is found in the majority of the Potamobiidæ. * * *

"If an Astacomorphous crustacean, having characters intermediate between those of *Eryma* and those of *Pseudastacus*, existed in the Jurassic epoch or earlier; if it gradually diverged into Pseudastacine and Erymoid forms; if these again took on Astacine and Homarine characters, and finally ended in the existing Potamobiidæ and Homarina, the fossil forms left in the track of this process of evolution would be very much what they actually are. Up to the end of the Mesozoic epoch the only known Potamobiidæ are marine animals. And we have already

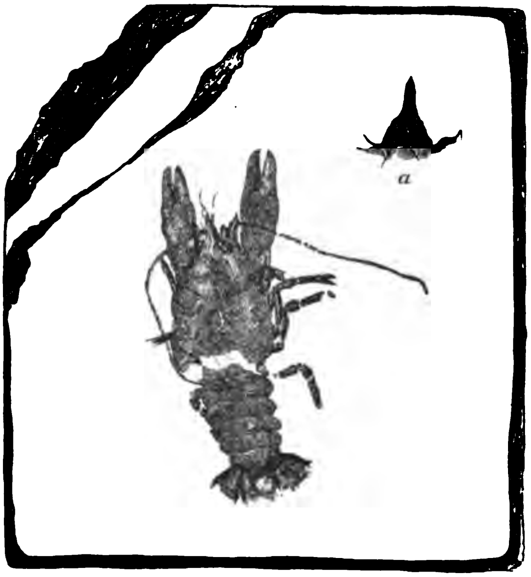

FIG. 1.—Cambarus primævus Packard; *a*, rostrum, enlarged.

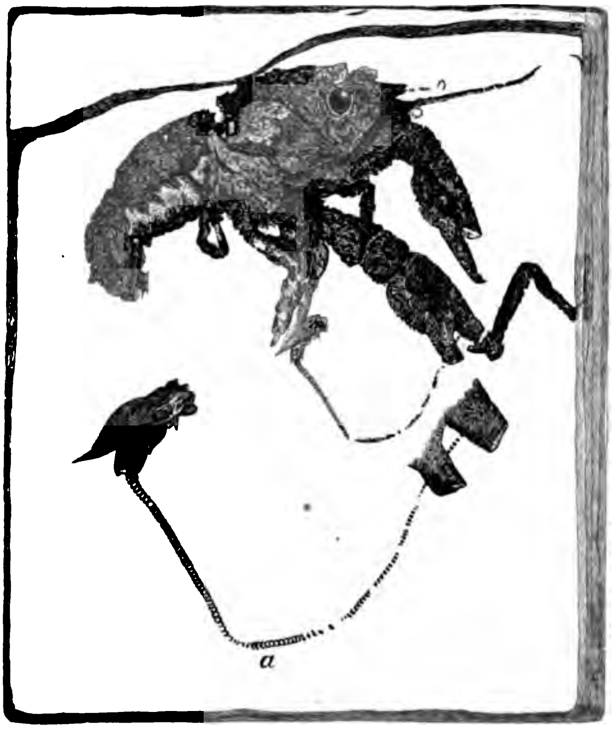

FIG. 2.—Second example of Cambarus primævus; *a*, antenna, with the scale, enlarged.

seen that the facts of distribution suggest the hypothesis that they must have been so, at least up to this time.

"Thus, with respect to the ætiology of the crayfishes, all the known facts are in harmony with the requirements of the hypothesis that they have been gradually evolved in the course of the Mesozoic and subsequent epochs of the world's history from a primitive Astacomorphous form." (The Crayfish, p. 341–346.)

It will thus be seen that the discovery of an apparently fresh water *Cambarus* in the Green River beds of Western Wyoming, which are supposed to be Lower Eocene strata, fills up a break in the geological series hitherto existing between the Cretaceous and Pliocene crayfishes, and shows that the dynasty of fresh water crayfish now so powerfully developed in the United States began its reign during the early Tertiary period.

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Art. XVIII.—Preliminary List of Works and Papers Relating to the Mammalian Orders Cete and Sirenia.

By Joel Asaph Allen.

Preparatory to undertaking the preparation of a history of the species of the North American *Cete* and *Sirenia*, I began, some time since, a systematic examination of the literature of the subject, taking titles and making notes for future reference. It soon occurred to me that the annotated list begun for my own use might be of service to other investigators in Cetology and Sirenology, and with this point in view I set about the preparation of a bibliography of these subjects. The titles thus far gathered are believed to cover nearly everything of importance bearing upon their technical aspects, besides the more important of those relating to their economical and commercial phases. The deficiencies relate mainly to the latter, and consist in great degree of casual notices of animals of the above-named orders in narratives of travel and exploration, and in periodicals of an ephemeral or non-scientific character, relating generally to the capture or stranding of Whales at different localities, and notices of Whaling. To make a bibliography which should be exhaustive in these respects would be, it is needless to say, the work of a lifetime, and would scarcely repay the labor expended beyond a certain point of completeness, believed to have been nearly reached in the collection of titles here presented. One department of the subject of the *Whale-fishery*, for example, has been intentionally wholly neglected, namely, legislation for its promotion and regulation by different governments. This alone would furnish hundreds of titles, which, while having only a remote bearing on the natural history of Whales, would still have some importance in regard to the history of Whaling.

The titles here given have been taken by the writer, when not otherwise stated, from the works and papers mentioned, and the comments, unless otherwise indicated, are based on personal examination of the same. Many titles relating to the Whale-fishery have been copied from D. Mulder Bosgoed's invaluable "Bibliotheca Ichthyologia et Piscatoria" (8°, Haarlem, 1873), especially many of those published in the Dutch language. The titles have, in many cases, been taken by preference from this author, for two reasons: first, they are generally more fully given by him, and with greater regard to literal transcription, than in many other works; and, secondly, they are usually accompanied with references to the particular portion of works, when of a general character, relating to the special subject here in hand. The titles unaccredited may be considered as representing the literary resources in this field of research afforded by the principal libraries of Cambridge and Boston, circumstances having thus far prevented me from consulting those of other cities. In some cases the sets of periodical publications have proved incomplete, and in a few cases wholly wanting. To cover these deficiencies, titles of works or papers known to me through citation by authors have been taken from the Royal Society's "Catalogue of Scientific Papers," or from other bibliographical sources. In this way it is believed that few papers of actual scientific value have escaped record. I have, however, proof of the incompleteness of this "Preliminary List" in the considerable number of "catch references" still in hand, which are too incomplete for insertion, but which an effort will be made to perfect as opportunity may favor, to be given later, with such others as may be met with, in a contemplated reprint of the present "List." In view of a probable later edition, the author earnestly solicits the correction of errors that may be discovered in the present, and would be glad to have his attention directed to any omissions.

In regard to the plan of the present undertaking, it may be stated that the titles are arranged chronologically, with an alphabetical disposition of authors under each year. The index to the "List" (the titles being consecutively numbered) will facilitate reference to any particular author or paper desired. In the case of minor papers, the annotations are intended as simply an amplification of the title—in other words, an explanation of the scope and nature of the article cited. In works of a general character, containing brief references to the matter here in hand, the particular portion of the work relating to the subject is stated, with an indication of its extent and importance. In the case of monographs, anatomical memoirs, or special works, the contents are indicated by the transcription of sub-titles, when such occur, and by further amplification when deemed desirable; in other cases by supplied sub-headings. Each species formally mentioned or figured is enumerated, with page-references, and in case of figures an indication is given of their nature or bearing. As a matter of convenience, the species are generally numbered with Arabic numerals in heavy type, these showing at a glance the number of species formally treated or recognized in the work or memoir. In the case of old works, or where vernacular names are alone used, the modern current systematic equivalent is frequently indicated. In every instance where such occur, *new species* and *new genera* are especially distinguished.

Great care has been taken to make the transcription of titles strictly literal, interpolations or emendations being inclosed in brackets. Errors of transcription can, nevertheless, scarcely be otherwise than frequent, as every bibliographer must be well aware. The orthography and capitalization of scientific names are intended to be literal, or in accordance with the usage of the particular work under notice, from which, however, there are doubtless occasional lapses. The attempt has been made to bring the "List" down to the end of the year 1880, but a few later titles have been added, and there are doubtless many deficiencies for the last year of the record.

MUSEUM OF COMPARATIVE ZOOLOGY,
Cambridge, Mass., September, 1881.

1495. Albertus Magnus. Diui Alberti Magni de Animalibus | libri vigintisex Novissime Impressi. [First page.] fol. ll. 6, ff. 1–254.

Impressum Uenetijs per Joannem & Gregorium | de Gregorijs fratres. Anno incarnationis dominice | Millesimo quadringentesimo nonagesimo quinto | die, xxi. Maij. Regnante dño Augustino Barbadi co | inclito Duce Uenetiaꝝ [f. 254].

Cetus, *f.* 240; Delphinus, *f.* 241; Monoceros, *f.* 244. The interest attaching to the cetological matter is purely historic. [1.]

1510. Andrew, Laur. "The wonderful shape and nature of man, beastes, serpentes, fowles, fishes, and monsters, translated out of divers authors by L. Andrew of Calis, and printed at Antuerpe, by John Doesborow. (Doesborch, 1510.) fol. With pictures."

Not seen; title from Bosgoed, *op. cit.*, p. 2, no. 10. [2.]

1526. Oviedo, G. F. de. Ouiedo dela natural hy | storia delas Indias. | Con preuilegio dela | S. C. C. M. | [Por Gonzalo Fernandez de Oviedo y Valdés. Toledo. 1526.] 4°. ff. i–lij+3 pp.

Delos manaties, *f.* xlviij (30 lines). The account of the Manatee here given is brief in comparison with that in the *Hist. gen. Ind.*, 1535, *q. v.* [3.]

1533. Martyr, P. Petri Martyris | ab Angleria mediolanen. Oratoris | clarissimi, Fernandi & Helisabeth Hispaniarum quondam regum | à consilijs, de rebus Oceanis & Orbe nouo decades tres: quibus | quicquid de inuentis nuper terris traditum, nouarum rerum cupi- | dum lectorem retinere possit, copiose, fideliter, eruditiꝗ docetur. | Eivsdem praeterea | Legationis Babylonicae li | bri tres: vbi praeter oratorii mvneris | pulcherrimum exemplum, etiam quicquid in uariarum gentium mori- | bus & institutis insigniter pręclarum uidit queꝗ terra mariꝗ acciderunt, | omnia lectu mirè iucunda, genere dicendi politissimo traduntur. | [Design.] Basileae, | — | M. D. XXXIII. | fol. ll. 12, ff. 1–92.

Manati, *f.* 60, C, D. [4.]

1535. Oviedo, G. F. de. La historia general | delas Indias. | [Por Gonzalo Fernandez de Oviedo y Valdés.] Con priuilegio imperial. [Sevilla, 1535.] | 4°. ll. 4, ff. i–cxciij.

Capitulo x. Del Manati y de su grandeza & forma: & de la manera que algunas vezes los indios tomauan este grāde animal conel pexe reuerso: & otras particularidades. ff. cvj–cviij, fig.

The account occupies 5 pp., and is important as the source whence many later compilers drew their materials for the history of the Manatee, and is still historically of the highest interest. There is a small, very rude cut, bearing some likeness to the general form of the Manatee—the earliest figure of the animal published. In the edition of 1547 the text (ff. cvj–cviij) is the same as in the present, but the figure is slightly different, showing an attempt at artistic improvement. [5.]

1551. **Bélon, Pierre.** "L'histoire Naturelle des Estranges Poissons Marins, avec la vraie Peincture et Description du Dauphin et de plusieurs autres de son espece, Observée par Pierre Bélon du Mans. A Paris, 1551. 4°. pp. 115."

Not seen; title from Dr. David Cragie in *Edinb. Phil. Journ.*, xi, 1831, p. 43, where he gives a critical *résumé* (*op. cit.*, pp. 43–48) of Bélon's account of the anatomy of the Porpoise. [6.]

1552. **Aristoteles.** Aristotelis et | Theophrasti | Historiæ, Cùm de natura Animalium, tum de Plantis | & earum Causis, cuncta ferè, quæ Deus opt. | max. homini contemplanda exhibuit, ad | amussim complectentes: nunc iam suo resti- | tutæ nitori, & mendis omnibus, quoad fieri | potuit, repurgatæ. | Cvm Indice Copio- | sissimo: | Ex quo superfluum quod erat, decerpsimus: quod uerò | necessarium nobis uisum est, superaddidimus. | Estote Prvdentes, | [Vignette] | sicvt serpentes. | Lvgdvni, | Apud Gulielmum Gazeium, | M.D.LII. | Cum Priuilegio Regis. | 8°. ll. 40, pp. 1–495, ll. 8 (animal.), ll. 28, pp. 1–399, ll. 7 (plant.).

De partu, & pullorum numero piscium uiuiparum, delphino, balæna, vitulo marino, & reliquis, quæ cete appellantur. Liber vi, caput xiii, pp. 141–143.

Several earlier and numerous later editions and commentaries of this work are intentionally omitted. [7.]

1553. **Bellon, P.** [*or* **Belon, P.**] Petri Bellonii Cenomani | De aquatilibus, Libri duo | Cum eiconibus ad vinam ipsorum effigiem, quoad | eius fieri potuit, expressis. | Ad amplissimum Cardinalem Castillionæum. | Parisiis. | Apud Carolum Stephanum, Typographum Regium. | M. D. LIII. | Cum privilegio Regis. obl. 8°. ll. 16, pp. 1–448.

De cetaceis, ossibus præditis ac viuiparis, pp. 4–18.—Balena, pp. 4, 5; Delphinus, pp. 7, 8, fig., p. 6 (apparently of *Phocœna communis*); fig., p. 9 (apparently of *Delphinus delphis*); Non esse Delphinvm incvrvvm, p. 9; fig., p. 10 (apparently of *Delphinus delphis*); Duo Delphini incurui, dorso repando, ex antiquissimo numismate æreo, figs., p. 11; Quid Delphinus a Tvrsione distet, p. 12; Matricis Delphini cum fœtu efformatio, fig., p. 13; Delphini caluaria, text and fig., p. 14; Tvrsio, p. 15, fig., p. 16; Orca, pp. 16, 17, fig., p. 18. Dolphin-like figure with fœtus attached by fœtal envelopes.

The figures were all reproduced by Gesner, and were also copied by various later authors. [8.]

1554. **Gomara, F. L. de.** La Historia | general delas Indias, | con todos los descubrimientos, y cosas nota | bles que han acaescido enellas, dende | que se ganeron hasta agora, escri- | ta por Francisco Lopez | de Gomara, clerigo. | Añadiose de nueuo la descripcion y traça delas Indias, | con una Tabla alphabetica delas Prouincias, Islas, | Puereos, Ciudades, y nombres de conquistadores | y varones principales que alla han passado. | [Cygnet.] En Anvers. | En casa de Iuan Steelsio. | Año M. D. LIIII. | sm. 8°. ll. 16+ff. 1–287.

Dela Pez que llaman enla Española Manati, cap. xxxi, ff. 37, 38. [9.]

1554. **Rondelet, G.** Gvlielmi | Rondeletii | Doctoris medici | et medicinae in schola | Monspeliensi Pro- | fessoris Re- | gii. | Libri de Piscibus Marinis, in quibus | veræ Piscium effigies expressæ sunt. | Quæ in tota Piscium historia continentur, indicat | Elenchus pagina nona et decima. | Postremò accesserunt Indices necessarij. | [Design.] Lvgdvni | Apud Matthiam Bonhomme. | — | M. D. LIII. | Cum Priuilgio Regis ad duodecim annos. 2°. ll. 8, pp. 1–583, ll. 12.

De Delphino, lib. xvi, cap. viii, pp. 459–473, fig., p. 459 (a Dolphin with young in fœtal envelopes). De Phocæna, lib. xvi, cap. ix, pp. 437, 474. De Tursione, lib. xvi, cap. x, pp. 474, 475, fig. De Balæna vulgò dicta siue de Musculo, lib. xvi, cap. xi, pp. 475–482, fig., p. 475 (view from above of some pisciform creature having more resemblance to a fish than a Whale. Also fig. of a harpoon on same page). De Balena vera, lib. xvi, cap. xii, pp. 482, 483, fig. (anim. fict.). De Orca, lib. xvi, cap. xiii, pp. 483–485, fig., p. 483. De Physetere, lib. xvi, cap. xiiii, pp. 485–487, fig., p. 485. De Manato, lib. xvi, cap. xviii, p. 490.

The figure "De Delphino" greatly resembles Bellon's figure of his "Orca, Oudre, ou grand Marsouin," but differs in details, and is not the same. [10.]

1555. "**Belon, P.** La nature et diversité des poissons. Avec leurs pourtraicts representez au plus près naturel. Paris, Ch. Estienne, 1555. obl. 8°. 448 ll."

Not seen; title from Bosgood, *op. cit.*, p. 3, no. 24. [11.]

1555. "**Olaus Magnus.** Historia de gentibus septentrionalibus earumque diversis statibus, conditionibus, moribus, ritibus, superstitionibus. Romae, de Viottis, 1555. 4°. [fol.?] Met houtgr."

"Lib. xxi. De piscibus monstrosis; de modo piscandi Cetos et Balenas; de Spermate-ceti. etc., etc."

Not seen; title and reference from Bosgoed, *op. cit.*, p. 109, no. 1732.

This is said by Bosgoed to be the first and best edition of the work. Other editions appeared later: Antwerp, 1558 (Latin) and 1561 (French); Venice, 1565; Basel, 1567; Amsterdam, 1599; Frankfort, 1625; Leyden, 1645; Amsterdam, 1652; the form varying from 8° to fol., and the text modified by abridgment, or amplified by the addition of extraneous matter. I give *infrà*, from Bosgoed, a collation of the Dutch edition of 1599, *q. v.* [12.]

1558. "**Boussueti, Fr.** De natura aquatilium carmen, in universam G. Rondeletii, quam de piscibus marinis scripsit historiam. Cum vivis eorum imaginibus. Lugduni, apud M. Bonhomme, 1558. 2 pt. 4°."

Not seen; title from Bosgoed, *op. cit.*, p. 4. no. 35. [13.]

1558. **Gesner, Conrad.** Conradi Gesneri | medici Tigurini Historiæ Animalium | Liber IIII. qui est de Piscium & | Aquatilium animantium | natura. | Cvm Iconibvs singvlorvm ad | vivam expressis fere omnib. DCCVI. | Continentur in hoc Volumine, Gvlielmi Rondeletii quoq, | medicinæ professoris Regij in Schola Monspeliensi, & Petri Bel- | lonii Cenomani, medici hoc tempore Lutetiæ eximij, de | Aquatilium singulis scripta. | Ad invictissimvm principem divvm Ferdinan- | dum Imperatorem semper Augustum, &c. | . . . [motto in Greek, 1 line.] | [Vignette.] Cvm Priuilegijs S. Cæsareæ Maiestatis ad octennium, & poten- | tissimi Regis Galliarum ad decennium. | Tigvri apvd Christoph. Froschovervm, | Anno M. D. LVIII. | gr. 2°. ll. 6, pp. 1–1297. (Figg. in text.)

De Balaena vvlgo dicta, sive de Mysticeto Aristotelis, Mvscvlo Plinii, pp. 132–141 (fig. p, 132). De Cetis vel Cetaceis piscibus, et Bellvis marinis in genere, pp. 229–237. De Cetis diversis, pp. 237–256, fig., p. 253 (de . . . Cetis Oceani Germanici). De Delphino, pp. 380–410. De Phocaena sev Tvrsione, pp. 837–839. De (Physalo Bellva, sev) Physetere, pp. 851–859.

Includes, in substance, the text of Belon and Rondelet, with much additional matter, mainly from still earlier authors. The above-cited figures are, with possibly one exception, from either Belon or Rondelet. At pp. 246–251 are descriptions and figures, mostly from Olaus Magnus, of various fabulous marine monsters.

For editions of 1560 and 1563, see *infrà;* later ones (not seen by me) are: Frankfort, gr. fol., 1604, 1620. [14.]

1558. **Rondelet, G.** Le Premiere Partie | de | l'Histoire | entiere des | Poissons, | Composée premierement en Latin par maistre | Guilaume Rondelet Docteur regent en Me- | decine en l'université de Mompelier. | Maintenant Traduite en François sans auoir | rien . . . [word torn out] necessaire à l'intelligence d'icelle. | . . . [word torn out] portraits au naif. | [Vignette.] À Lion, | par Mace Bonhome | a la Masse d'Or. | — | M. D. LVIII. | Avec privilege dv Roy povr dovze ans. | 4°. ll. 6, pp. 1–418, ll. 7. [Partie Seconde.] pp. 1–181, ll. 5. [Numerous cuts in the text.]

Le Seiziéme Livre des Poissons; Des Poissons Cétacées é grandes bestes marines. éspecialement des Tortues, pp. 336–364.—Du Dauphin, pp. 344–350, cut; Du Marsouin, p. 350, cut; De la Balene vulgaire, pp. 351. 353, cut; De la vraie Balene, pp. 353, 354, cut; De l'Espaular, pp. 354, 355, cut; Du Malar ou Sendette, pp. 355, 356, cut; De la Viuelle, pp. 356, 357, cut; De la Scolopendre cetacée, pp. 357, 358, cut; Du Tiburon, pp. 358, 359; Du Maraxe, p. 359; Du Manat, pp. 359, 360.

Le Seiziéme Livre includes not only the species above named, but also the Sea-Tortoises, and various anthropomorphous marine monsters. The first four books treat of the general economy of "Fishes," including their external and internal anatomy, their habits, faculties, etc., and of modes of capturing them, including the *Cetacea passim.* The figures are the same as those of the Latin ed. (1554), *q. v.* The second division of the work contains the marine Invertebrates, the fluviatile Fishes, Amphibians, Reptiles, and Turtles, and also the Beaver, "le Bieure." [15.]

1558. **Thevet, F. A.** Les | Singvlari- | tez de la France an- | tarctiqve, avtrement nom- | mée Amerique, & de plusieurs Ter- | res & Isles decouuertes de no- | stre temps: | Par F. André Thevet, na- | tif d'Angovlesme. | [Seal.] A An-

1558. **Thevet, F. A.**—Continued.
vers, | De l'imprimerie de Christophle Plantin | a la Licorne d'or. | 1558. | Avec Privilege dv Roy. | sm. 8°. ll. 8, 1–163+1. (Cuts in text.)

Description du manati, poisson estrange, p. 138. [16.]

1560. **Gesner, Conrad.** Nomenclator | aqvatilivm animantivm. | Icones Animalivm a- | quatilium in mari & dulcibus aquis de- | gentium, plus quàm Dcc. cum nomen- | claturis singulorum Latinis, Grȩcis, Itali- | cis, Hispanicis, Gallicis, Germanicis, | Anglicis, alij'sq; interdum, per cer- | tos ordines digestæ. | Explicantvr autem singulorum nomina ac nominũ rationes, præ- | certim in Latina et Græca lingua vberrimè: et nominum confirmandorum causa | descriptiones quorundam, et alia quædam, præsertim in magno nostro De aquatili- | bus volumine non tradita, adduntur: deꝙ singulis Rondeletij, Bellonij, Saluiani et | nostræ sententiæ explicantur breuissimé. | Per Conradvm Gesnervm Tigvrinvm. | Le Figure de pesci e d' altri animali, li quali uinono ne l' acque | salse o dolci, piu che DCC. | . . . [The same repeated in French, 2 lines, and in German, 2 lines.] | Cvm Privilegijs S. Cæsaræ Maiestatis, ad annos octo, & poten- | tissimi Regis Galliarum ad decennium. | Tigvri excvdebat Christoph. Froscho- | vervs. Anno M. D. LX. | 2°. ll. 14, pp. 1–374, l. 1. (Figg. in text.)

Ordo XII: De Cetis proprie dictis, pp. 160–185. Figg. Delphinus fœmina cum fœtu masculoso, ut Rondeletius exhibuit [= *Phocæna communis*], p. 161; Alia Delphini pictura, quam à Corn. Sittardo habui [= *Delphinus delphis*], p. 161; Delphini caluaria è libro Bellonij [= *D. delphis*], p. 162; Ex eodem, Delphini matricis cum fœtu efformatio: quæ Phocænæ etiam conuenit, p. 162; Ex eodem, Antiquissimi numismatis ærei pictura: quod Delphinos duos dorso repando curuos ostendit, non quòd eiusmodi uerè sint: . . . p. 162; Tursio, p. 163; Balænæ, fig. et descrip., pp. 166–169 (3 figg.): Pristris aut Physeter, horribile genus cetorum, & ingens ex capite multum aquæ in naues efflat, & aliquando submergit, Olaus Magnus in Tabulæ suæ explicatione: . . . p. 170; Balæna, Adden., pp. 366–368, fig., p. 367 [= *Physeter macrocephalus*]. Rostrum uel os à capite prominens, satis commodè exprimi uidetur: reliquum uerò corpus ad coniecturam à Rondeletio effictum, p. 171.

The article "De Cetis" includes not only the true *Cete* but also *Pinnipedia*, and the pelagic Turtles, as well as the many fabulous monsters of the sea depicted by Olaus Magnus, etc.

In this work, usually cited as *Icon. Anim. Aquat.*, the text is much reduced from that of the *Hist. Animal.*, 1558, *q. v.* (from about 80 pp. to 24 pp.), but the cuts are nearly all reproduced (three or four only are omitted), and others are added, including a larger and much improved one of the skull of the Dolphin in place of the former one. In the "Addenda" is a description and figure of a Sperm Whale stranded June, 1755, on the coast of the Adriatic Sea. This is one of the earliest figures of this species, and a better one than some published two centuries later. [17.]

1560. **Giovio, Paolo.** Libro di | mons. Paolo Giovio | de' pesci Romani. | tradotto in Volgare da | Carlo Zancaruolo. | Con privilegio. | [Vignette with motto.] In Venetia, appresso il Gualtieri, 1560. 4°. pp. 1–198.

Del Capidoglio (= *Orca*), cap. 2, pp. 22–27. [18.]

1563. **Gesner, Conrad.** "Fishbuch Das ist ein kurtze, doch vollkom̃ne beschreybung aller Fischen so in dem Meer unnd süssen wasseren, Seen, Flüssen oder anderen Bächen jr wonung habend, sampt jrer waaren conterfactur: zü nutz u. gütem allen Artzeten etc. gestelt: insonders aber denen so ein lust habend zü erfaren und betrachten Gottes wunderbare werck in seinen geschöpfften. Erstlich in Latein durch *Cünradt Gässner* beschriben; yetz neüwlich aber durch *Cünradt Forer* etc. in das Teütsch gebracht. (Mit eingedr. Holzschnitten.) In Fol. *Zürych*, (1563 u.) 1575. *Froschover*. (9 u. 404 S.)"

Not seen; title from Carus and Engelmann, *Bibl. Hist. Nat.*, i, p. 433. For account of Cetological matter see the *ed. prin.*, 1560. [19.]

1565. **Benzoni, G.** La Historia del | Mondo Nvovo | Di M. Girolamo Benzoni | Milanese. | Laqval Tratta dell'Isole, | & Mari nuouamente ritrouati, & delle nuoue | Città da lui proprio vedute, per acqua | & per terra in quattordeci anni. | [Portrait.] Con Priuilegio della Illustrissima Signoria | di Venetia, Per anni xx [=1565]. sm. 8° by sig., 24° size. ll. 4, ff. 1–175. Reverse of f. 175: In Venetia, | appresso Francesco | Rampazetto. | MDLXV.

Manati, p. 96. [20.]

1565. RAMUSIO, G. B. Terzo Volvme | delle Navigatione et Viaggi | raccolto gia da M. Gio. Battista Ramusio | nel qvale si contengono | . . . [=13 lines descriptive of contents]. Si come si legge nelle diuerse Relationi, tradotte dal Ramusio di Lingua | Spagnuola & Francese nella nostra, & raccolte in questo volume. | . . . [=3 lines]. | [Design.] In Venetia nella stamperia de' Givnti. | L'Anno M. D. LXV. fol. ll. 6, ff. 1–34, 1–456. Maps and cuts.

Manati, ff. 40, 71, 72, 159–161; cut, f. 159. The figure is a copy of Oviedo's, appreciably altered. The account given is also a translation from Oviedo. [21.]

1577 (*circa*). ANON. "Ware und eigentlicher Contrafactur eines Wallfisches, gefangen in der Scheldt, nicht weit von Antorff, Am 5 Julij Anno 1577. (Als bovenschrift van de prent. Van onderen een 16 regelig Hoogduitsch vers.) br. folio."

Not seen; title from Bosgoed, *op cit.*, p. 176, no. 2771, who says: "Zie: *Muller*, Beschrijving van Ned. historieprenten, no. 788." [22.]

1578. BENZONI, GIROLAMO. Novae Novi | orbis Historiæ, | Id est, | Rerum ab Hispanis in India Occidentali ha- | ctenus gestarum, & acerbo illorum | in eas gentes dominatu, | Libri tres, | Vrbani Calvetonis | opera industriáque ex Italicis Hieronymi Benzo- | nis Mediolanensis, qui eas terras xiiii. anno- | rum peregrinatione obijt, commentarijs descripti; Latini facti, ac perpetuis notis, argumentis & locu | pleti memorabilium rerum accessione, illustrati. | His ab eodem adiuncta est, | De Gallorum in Floridam expeditione, & insigni Hispanorum | in eos fæuitiæ exemplo, Breuis Historia. | Anchora [Design] Sacra. | [Genevæ.] | Apvd Evstathivm Vignon. | — | M.D.LXXVIII. 8°. ll. 16, pp. 1–480, ll. 6.

Manati pisces, cap. xiii, pp. 213, 214, 216, 217. There is first in the text (pp. 213, 214) a short account of the Manati of Nicaragua, and at the end of the chapter (pp. 216, 217) a further account, based on that given by Peter Martyr (1533), *q. v.* The last is additional to that of the original edition, 1565, *q. v.* [23.]

1590. ACOSTA, J. DE. Historia | Natvral | y | moral delas | Indias, | en qve se Tratan las Cosas | notables del cielo, y elementos, metales, plantas, y ani- | males dellas: y los ritos, y ceremonias, leyes, y | gouierno, y guerras de los Indios. | Compuesta por el Padre Ioseph de Acosta Religioso | de la Compañia de Iesus. | Dirigida ala serenissima | Infanta Doña Isabella Clara Eugenia de Austria. | [Design.] Con Privilegio. | Impresso en Seuilla en casa de Iuan de Leon. | — | Año de 1590. 4°. pp. 1–535, ll. 15.

De diuersos pescados, y modos de pescar de los Indios. Lib. iii. cap. "17" (*i. e.* xv). pp. 158–162.

Manati, p. 158; Vallena, pp. 160, 161.

There are only a few lines about the Manati, and these are not important. The account of the capture of Whales by the Indians of Florida, as related to him by "some expert men," is of special interest, as being doubtless the origin of the relation, so often told later, of how the Indians of Florida capture the Whale by getting astride his neck and plugging his nostrils with wooden stakes, to which they afterwards attach cords and by them tow the Whale, thus killed, to the shore. It is doubtless on this description that the illustration of this manner of killing Whales is based in De Bry. (*See* DE BRY, 1602.)

Of the numerous subsequent editions and versions of Acosta's work a number are given below, including an Italian (1596), a French (1598), and an English (1604). (*See* ACOSTA, J. DE, under these dates.) There is a Latin translation in De Bry, fol., 1602 (part ix of the "Greater Voyages.") [24.]

1593. PLINIUS SECUNDUS, C. C. Plinij Secundi | Historiæ Mvndi | Libri xxxvii. | A Sigismvndo Gelenio | summa fide castigati, veterúmque tum excu- | sorum tum manuscriptorum codicum atten- | tissima collatione restituti. | Accessere ad marginem variæ lectiones, ex | Pintiani, Tvrnebi, LipsiI, | aliorúmque doctissimorum qui pagina quarta | indicantur scriptis fideliter exceptæ. | Opus tributum in tomos tres cum Indice | rerum onnium copiosissimo. | Tomus Primus [-Tertius]. | [Vignette.] | Apvd Iacobvm Stoer. | — | M. D. XCIII.

The title changes in the second and third volumes to the following:

C. Plinii | Secvndi Histo- | riæ Mvndi | Tomus Secundus [-Tertius], A Sigismvndo Gelenio diligenter | castigatus, veterúmque codicum colla- | tion

1593. Plinius Secundus, C.—Continued.
restitutus. | Additæ ad marginem variæ lectiones ex | doctorum virorum scriptis fideli- | ter exceptæ. | Quæ hoc Tomo continentur sequens | pagina indicat. | [Vignette.] Apvd Iacobvm Stoer | — | M. D. XCIII. 3 vols. sm. 8° by sig., 16° size.

De balænis, & orcis, tom. i, liber ix, cap. vi, pp. 415, 416. De Delphinis, cap. viii, pp. 417–421. De tursionibus, cap. ix, p. 421.

There are earlier and numerous later editions and commentaries of the work, but they are intentionally omitted. [25.]

1594. Pomet, Pierre. Histoire | generale | des | Drogues, | traitant | Des Plantes, des Animaux, | & des Mineraux; Ouvrage enrichy de plus de | quatre cent Figures en Taille-douce tirées d'aprés | Nature; avec un discours qui explique leurs | differens Noms, les Pays d'où elles viennent, la | maniere de connoitre les Veritables d'avec les | Falsisiées, & leur proprietez, où l'on découvre | l'erreur des Anciens & des Modernes; Le tout tres | utile au Public. | Par le Sieur Pierre Pomet, Marchand Epicier & Droguiste. | [Design.] A Paris, | Chez Jean-Baptiste Loyson, & Augustin Pillon, sur le Pont au Change, | à la Prudence. | Et au Palais, | Chez Estienne Ducastin, dans la Gallerie des Prisonniers, au bon Pasteur. | — | Avec Approbation & Privilege du Roy. | M. DC. XCIV. fol. ll. 6, pp. 1–16; pt. i, 1–304; pt. ii, 1–108; pt. iii, 1–116, ll. 19.

Sur l'Ambre gris, p. 3 (de sér. prem. de pag.); part ii, chap. xxvi, pp. 57–60. De la Baleine, part ii, chap. xxxi, pp. 73–75, 2 figs. (Cachalot, ou Baleine Maslo et Baleine Femelle). Du Narwal, part ii, chap. xxxiii, pp. 78–80, 2 figs. (Licorne de Mer et Narwal). Du Lamantin, part ii, chap. xxxv, pp. 82–84, fig.

The figures are very curious, as is also the text. The figures of the Cachalot represent the process of flensing. The figure of the Manatee is apparently copied from an earlier design. [26.]

1595 ? Goltzius, H. "Walvisch of Tonyn, gestrand te Zandvoort, 1595. Met adres van (en door) *H. Goltzius*, en 14 regelig hollandsch vers. br. 4°."

Not seen; title from Bosgoed, *op. cit.*, p. 176, no. 2772, who says: "Zie: *Muller*, Historieprenten, no. 1033." [27.]

1596. Acosta, J. de. Historia | Natvrale, e Morale | delle Indie; | scritta | Dal R. P. Gioseffo di Acosta | Della Compagnia del Giesù; | Nellaquale si trattano le cose notabili del Cielo, & de gli | Elementi, Metalli, Piante, & Animali di quelle: | i suoiriti, & ceremonie: Leggi, & gouerni, | & guerre degli Indiani. | Nouamente tradotta della lingua Spagnuola nella Italiana | Da Gio. Paolo Galveci Salodiano | Academico Veneto. | Con Privilegii. | [Design.] In Venetia, | — | Presso Bernardo Basa, All' insegna del Sole. | M. D. XCVI. 4°. ff. 24, 1–173.

Di diuerse pesci, & modi di pescare delli Indini, lib. iii, cap. xv, ff. 48–50.

For comment, see the *editio princeps*, 1590. [28.]

1598. Acosta, J. de. Histoire | Natvrelle | et Moralle | des Indes, tant Orientalles | qu'Occidentalles. | Où il est traicté des choses remarquables du Ciel, | des Elemens, Metaux, Plantes &. Animaux | qui sont propres de ces païs. Ensemble des | mœurs, ceremonies, loix, gouuernemens & | guerres des mesmes Indiens. | Composée en Castillan par Joseph Acosta, & | traduite en François par Robert | Regnault Cauxois. | Dedié av Roy. | [Vignette.] A Paris, | Chez Marc Orry, ruë S. Jaques, | au Lyon Rampant. | — | M. D. XCVIII. sm. 8°. ll. 8, ff. 1–375+17.

De diuers poissons, & de la maniere de pescher des Indiens, liv. iii, chap. xv, ff. 102–105.—Manati, f. 102; Pesche de la Balaine en Florida, f. 103.

For comment, see the original ed. of 1590. [29.]

1598 (*circa*). Anon. ? "Description du grand poisson baleine, qui s'est venue rendre à Berkhey en l'an MDXCVIII le III Febvrier, etc. (Znd. pl. of jaar.)"

"Vertaling van het voorgaande, met dezelfde afbeelding op den titel.

"Eene Engelsche vertaling verscheen te London, 1569. 4°."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 175, no. 2700. [30.]

1598 (*circa*). Anon.? "Eene beschrijvinghe des grooten Vischs, die tot Berkhey ghestrandet is A°. 1598 den 2 Febr., met eene verclaringhe der dinghen die daernaer ghevolght zijn. Met noch een cort verhael, enz. (Zud. pl. of jaar.)"

"Met eene afbeelding van den walvisch op den titel.

"Zie: Tiele, *Bibl. van pamfletten*, no. 431—Bor, *Ned. Oorl.*, (1697), iv, f. 434; (1621), 35e boek, f. 11."

Not seen; title and comment from Bosgoed, *l. c.*, p. 175, no. 2759. [31.]

1598 (*circa*). Matham, J. "Walvisch, gestrand tusschen Scheveningen en Katwijk in 1598. Door J. Matham, met 12 regelig hollandsch vers.—Van deze prent bestaan verschillende kopyen, o. a. door G. van der Gouwen. br. fol."

Not seen; title from Bosgoed, *op. cit.*, p. 176, no. 2773, who says: Zie: *Muller*, Historieprenten, no. 1081–1084."

(Muller's *Beschrijv. van Ned. historieprenten*, here and elsewhere cited from Bosgoed, I have been unable to see.) [32.]

1599. "Olaus Magnus. De wonderlycke historie der Noordersche Landen, beschreven door Olaus de Groote. Ook after aen by ghevoecht verscheyden waerachtige Nauigatien tegent Noorden ghedaen by onsen tyt, als op Nova-Zembla, Groenlant en door de Strate van Nassouwen anders Weygats ghenaemt. Amsterdam, Cornelis Claesz." (1599.) 4°.

"Zie aldaar, 21e en 22e boek: Van de visschen; van de vreemde en gedrochtelijke visschen, en walvischvangst. De appendix bevat de reizen naar het Noorden van St. Burrough, Frobisher, Pet and Jackman, en de drie eersten reizen der Hollanders. De 2e druk, 1652, 8°, bevat tevens 'Een korte en klare beschrijving van Ijslandt en Groenlandt,' door Dithmarius Blefkenius."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 244, no. 3526. See, also, Latin ed. of 1555. [33.]

1599. ——— The request of an honest merchant to a friend of his, to be aduised and directed in the course of killing the Whale, as followeth. An. 1575. <*Hakluyt's Navig. and Voyag.*, i, 1599, pp. 413, 414.

A series of questions respecting the provisioning and furnishing of a ship for a whaling voyage, with detailed answers, "which may serue as directions for all such as shall intend the same voyage, or the like, for the Whale." [34.]

1601. Saenredam, J. "Walvisch, gestrand onder Beverwyk, bezichtigd door Graaf Ernst Casimir, 1601. Door J. Saenredam. (Met 32 regelig latijnsch vers door T. Screvelius.)" gr. br. fol.

"Dezelfde prent met het adres van J. Janssonius, 1618. gr. br. fol."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 176, no. 2774, who refers to "*Muller*, Historieprenten, no. 1160." [35.]

1602. [Acosta, J. de.] De Novi Orbis Natvra et Ratione. <*De Bry, Americæ nona & postrema Pars*, 1602, pp. 1–362.

De diuersis generibus & formis piscium, in India nascentium, lib. iii, cap. xv, pp. 105–109.

For comment see orig. ed., 1590, and next title. [36.]

1602. De Bry, Theodorus, J. T., *et* J. I. Idæa | vera et genvina, | Præcipvarvm Historia- | rvm omnivm, vt et variorvm | Ritvvm, Ceremoniarvm, consvetvdi- | numque gentis Indicæ: Sicut & primarium ciuitatum, Insularum- | que & arcium seu propugnaculorum: dè quibus in hac | nona Americæ seu Indiæ Occidentalis histo- | riarum parte pertractatur. | Cvilibet Historicæ designationi, | facilioris intellectus, maiorisq; oblectationis causa, Icones ali- | quammultæ, artificiosissimè in æs incisæ, annexæ | appositæq; sunt, | Sumptibus, Studio & industria | Theodori de Bry, p. m. relictæ viduæ, & Ioann. Theodo- | ri ac Ioann. Israel. filiorum. | [Design.] Francofvrti, | Excvdebat Matthævs Becker. | — | M.DCII. fol. Tab. i–xxvi, cum texte.

Tab. i. De Indorvm mira piscationis ratione. Plate and 15 lines of text, illustrating the way in which the Indians capture whales, viz, by rowing up to them in their canoes and getting astride the neck and then driving wooden stakes into their blow-holes, which speedily causes their death by suffocation. They then attach lines to the stakes and tow the dead whale ashore. In the background is seen a dead whale being thus towed by an Indian in a canoe, and more in the foreground is an Indian astride a whale driving in the stakes, his canoe resting on the whale's back! The blow-holes are represented, as in other cuts of this date,

1602. De Bry, Theodorus, J. T., *et* J. I.—Continued.

as tubular projections on the sides of the head! This absurdity is apparently based on Acosta's account of the capture of whales by the Indians of Florida. (*See* Acosta, J. de, 1590.)

The fasciculus having the above-given title forms part of De Bry's celebrated Collection of Voyages. In the copy examined it is bound as the second fasciculus of "Nona pars Americæ," containing the voyages of Sobalt de Woert. [37.]

1604. Acosta, J. de. The | Natvrall | and Morall Historie of the | East and West | Indies. | Intreating of the remarkeable things of Heaven, of the | Elements, Mettalls, Plants and Beasts which are pro- | per to that Country: Together with the Manners, | Ceremonies, Lawes, Governements, and Warres of | the Indians. | Written in Spanish by Ioseph Acosta, and translated | into English by E. G. [Edward Grimeston]. [Design.] London | Printed by Val: Sims for Edward Blount and William | Aspley. 1604. 8°. ll. 10, pp. 1–590.

Of Sundry Fishers, and their maner of fishing at the Indies, lib. 3, chap. 15, pp. 163–169.—Manati, p. 164. Manner of capturing whales by the Florida Indians, pp. 166–168.

For comment see the orig. ed., 1590. [38.]

1605. Clusius, C. Caroli Clvsii Atrebatis, | Aulæ Cesareæ quondam Familiaris, | Exoticorvm | Libri Decem: | Quibus Animalium, Plantarum, Aromatum, | aliorumque peregrinorum Fructuum | historiæ describuntur: | Item | Petri Belonii Observationes, | eodem Carolo Clusio interprete. | Series totius operis post Præfationem indicabitur. | — | Ex Officinâ Plantinianâ Raphelengii, 1605. [Title-page with engraved border.] 2°. ll. 8, pp. 1–378, ll. 5.

Cete admirabilis formæ, p. 130, cum fig.; Aliud Cete admirabile, p. 131, cum fig.; Manati Phocæ genus, pp. 132–135, cum fig.

The "Cete admirabilis formæ" is a Cetoid monster; the mouth is open, displaying a continuous row of sharp-pointed teeth in the lower jaw; there are neither pectoral nor dorsal fins; the head is upturned, projects much beyond the lower jaw, and its termination may be likened to a cap formed of a gigantic squid, of which the tentacles constitute a fringe around the neck. The "Aliud Cete admirabile" is a Cachalot (*Physeter macrocephalus*), or "Potwalvisch" (as the text states it to have been called by the Hollanders), described and figured from a specimen stranded on the west coast of Holland in 1598. The figure is a half-side view, displaying the ventral surface, with the mouth open and the penis exserted. This is noteworthy as being apparently one of the earliest figures extant of the Sperm Whale. A specimen stranded three years later is also briefly described. Of the "Manati Phocæ genus" there is a quite characteristic, although rude, figure from a stuffed specimen brought to Amsterdam in the year 1600 by a Dutch navigator "ex Occidentali Oceano." In respect to the early history of the Manatee, Clusius justly holds the first place, his description and figure being the first based on an original examination of specimens.

There appears to have been an earlier edition, the work being cited at 1601 by Boegoed (*Bibl. Ichth. et Piscat.*, p. 168). [39.]

1606. Gomara, F. L. de. Histoire | generalle | des Indes occiden- | tales, et terres | neuues, qui iusques à present | ont esté descouuertes. | Augmentee en ceste cinquiesme edition de la description de | la nouuelle Espagne, & de la grande ville de Me- | xicque, autrement nommee, | Tenuctilan. | Composee en Espagnol par François Lopez de Go- | mara, & traduite en François par le | S. de Genillé | Marr. Fumée. | [Design.] A Paris. | Chez Michel Sonnius, ruë sainct Iaquez à l'enseigne | de l'escu de Basle. | — | 1606. | Avec privilige dv Roy. sm. 8°. ff. 4, 1–485+19.

Des poissons qu'on appelle en l'Isle Espagnole Manati, chap. 31, f. 41 (2 pages). [40.]

1608. Anon. ? "Ware Verthooning ende afbeeldinghe van een dooden. . . . Vis, door die Zee aen der Strande opgheworpen den 20 Sept. 1608, tusschen Catwijck ende Schevelingen. Middelburg, 1608. 4°. 20 bladz. tekst met afbeelding."

Not seen; title from Boegoed, *op. cit.*, p. 175, no. 2761. [41.]

1612. [Hudson, Henry.] "Beschryvinghe van der Samoyden Landt in Tartarien. Nieulycks onder 't ghebiedt der Moscoviten ghebracht. Wt de Russche tale overgheset, Anno 1609. Met een verhael van de opsoecking ende ontdeckinge van de nieuwe deurgang ofte straet int Noordwesten na de Rijcken van China ende Cathay. Ende een Memoriael gepresenteert aenden Coningh van Spaen-

1612. [**Hudson, Henry**]—Continued.

gien, belanghende de ontdeckinghe ende gelegenheyt van 't Land ghenaemt Australia Incognita. 't Amsterdam, by Hessel Gerritsz. A°. 1612. 4°. Met 3 kaarten."

Not seen; title transcribed from Bosgoed, *op. cit.*, p. 233, no. 3427. The title as given by Fr. Muller (*Cat. Am. Books*, 1877, p. 80) is abbreviated by the omission of the second and third sentences, and also otherwise. As the two titles otherwise differ, it is doubtful whether either is literally given, Bosgoed's appearing to be partly modernized in orthography. Muller's English rendering of his is as follows: "Description of the country of the Samoyedes in Tartary, With an account of the research and of the discovery of the new passage or strait in the North-West to the empires of China and Cathav (by Henry Hudson). And a memorial offered to the King of Spain (by P. F. de Quir) concerning the discovery and the situation of the Land called Australia Incognita." (For the title of the Latin translation, published the following year, *see* 1613. Hudson, H.)

Respecting the present Dutch edition, Muller says: "Of this original Dutch edition of the famous *Detectio freti* . . . hardly 4 or 5 copies are known in all the European libraries. . . . This original book is the foundation-stone for the history of Hudson's and other arctic expeditions, etc. The collection formed by Hessel Gerritsz consists of four tracts. by Is. Massa, F. de Quir, and the editor, Hessel Gerritsz himself."—F. Muller, *Cat. Amer. Books*, 1877, p. 80, no. 1425. [42.]

1613. "**Gerritz. van Assum, Hessel.** Histoire du pays nomme Spitsberghe. Monstrant comment qu'il est trouvée, son naturel et ses animauls, avecques la triste racompte des maux, que nos pecheurs tant Basques que Flamens, ont eu a souffrir des Anglois, en l'esté passée l'An de grace, 1613. Escrit par H[essel]. G[erretsz]. [de] A[ssum]. Et en apres une protestation contre les Angloys, et annullation de touts leurs frivoles argumens, parquoy ils pensent avoir droict, pour se faire Maistre tout seul, dudict pays. En Amsterdam, a l'enseigne de la carte nautiq. MDCXII [*sic*] Chez Hessel Gerritsz. 4°. Met 2 kaarten en eene plaat."

Not seen; title from Bosgoed, *op. cit.*, p. 236, no. 3462. Muller's collation gives the date as 1613, and "2 maps and 2 pl."—(*Cat. Am. Books*, etc., 1877, p. 80, no. 1423.)

The original edition is "of the utmost rarity." A *fac-simile* reprint (of 50 copies only) was issued in 1872 by Fr. Muller (Amsterdam), "with the real old types" of the 17th century, on old paper. [43.]

1613. **Hudson, H.** Descriptio ac delineatio Geographica | Detectio- | nis Freti, | Sive Transitus ad Occasum suprà | terras Americanas, in Chinam | atq; Iaponem ducturi. | Recens investigati ab M. Henrico Hudsono Anglo. | Item, | Exegesis Regi Hispaniæ facta super | tractu recens detecto, in quintâ Orbis parte, cui nomen, | Avstralis Incognita. | Cum descriptione | Terrarum Samoiedarum, & Tingoesiorum, in | Tartariâ ad Ortum Freti VVaygats sitarum, nuperq; | sceptro Moscovitarum adscitarum. | Amsterodami | — | Ex Officina Hesselij Gerardi. Anno 1613. sm. 4°. ll. 25, unpaged, 4 folded maps and 3 cuts.

Contains "Veram Effigiem Balenarum" (a half-page cut), and 8 lines of descriptive text. It occupies a separate leaf at the end of the book in two copies examined (in Harvard College Library), occurring after the word "Finis," which closes the preceding page. It almost has the appearance of not belonging to the book. Neither of these copies contain Hessel Gerrard's remarkable picture of the Walrus, said to occur in some copies of this work. (*Cf.* Allen, *Hist. N. Amer. Pinnipeds*, 1880, pp. 96, 97.)

"On this small but highly important work, see at large: Tiele, pp. 179 to 190, and my: *Essai d'une Bibliographie Néerl. Russe*, 1859, pp. 71, 103–108, especially on the unknown author, *Is. Massa*, of Haarlem. It contains: 1°. the discovery of the Hudson bay, etc. in 1611, with map, with additions to the former edition of 1612; 2°. the account of F. de Quir on Australia; 3°. and 4°. the description of the Samoyedes, their country, etc., etc., by Is. Massa, of Haarlem."—F. Muller, *Cat. Amer. Books*, 1877, p. 85, no. 1493.

A facsimile reprint, "with the real old types" of the 17th century, on old paper, has been recently published at Amsterdam by Frederik Muller & Co. [44.]

1615 (*circa?*) **Velde, Es. van den.** "Pot-Walvisch, gestrandt by Noortwyck op Zee, den 28 Dec. 1614. Door Es. van den Velde. kl. br. fol."

"Eene andere druk met adres van C. J. Visscher.—Van deze prent bestaat ook eene teekening in sepia door J. van de Velde."

Not seen; title from Bosgoed, *op. cit.*, p. 176, no. 2775, who refers to Muller's "Historieprenten, no. 1292-1293." [45.]

1617. PURCHAS, S. Of King Iames his Newland, alias, Greenland: And Of The Whale And Whale-Fishing. <*Purchas his Pilgrimage, or Relations of the World & the Religions observed in al Ages & Places*, etc., 3d ed., 1617, pp. 920–924.

Of special interest as containing the earliest English, and the first distinct, description of the Greenland Whale (*Balæna mysticetus*)—detailed, exceedingly quaint, and in the main quite correct. It was derived from information furnished by Master Thomas Sherwin, based on his experiences in whaling in the year 1611. [46.]

1622. WHITBOURNE, R. A | Discovrse | and Discovery | of Nevv-fovndland, with | many reasons to prooue how worthy and bene- | ficiall a Plantation may there be made, after a far | better manner than now it is. | Together with the laying | open of certaine enormities | and abuses committed by some that trade to that | Countrey, and the meanes laide downe for | reformation thereof. | Written by Captaine Richard Whitbourne of | Exmouth, in the County of Deuon, and pub- | lished by Authority. | As also, an Inuitation: and likewise certaine Letters sent | from that Countrey; which are printed in the | latter part of this Booke. [Design.] | Imprinted at London by Felix Kingston. 1622. sm. 4°. ll. 11, pp. 1–107, ll. 2½, pp. 1–15.

Reference to cod-fishing and whale-fishing (pp. 11–13) as carried on at the Grand Banks by the Biscayners in 1615.

The work was first published in 1620, without the appendix of the present edition; there is also a later (1623) edition, neither of which have I seen. The 1622 ed. seems to be the same as the ed. of 1620, so far as the body of the work is concerned, to which there is added, besides the above-mentioned appendix, 2 preliminary leaves, containing also new matter. [47.]

1622–35. "WASSENAER, CLAES. Historisch verhael alder ghedenck-weerdichste Geschiedenissë, die hier en daer in Europa, als in Duitsch-laut, Vranckrijk . . . en Neder-laut, Asia, America en Africa, van den beginne des jaers 1621 tot Octobri des jaers 1632 voorgevallen sijn. (Met platen, kaarten en portretten.) Tot Amstelredam, by Jan Evertsz. Kloppenburgh, 1622–1624, J. Hondius, 1624, en Jan Jansz, 1625–35. 21 dln., 7 bdn. 4°.

"Zie aldaar: Welvaert van de Noortsche Compagnie (gelukkige walvischvangst). De inwoonders van Spitsberghen. Het verloop van de walvisschen, v, 1623, Septemb., bl. 157–158. Van het eylandt Spitsbergen, alwaer de genereuse Willem Tas, capiteyn, zijn couragie toont. Ook van de walvisschen, haer baerden en vinnen, baleynen genaemt, die Jan Osborn, seer konstigh verwerckt. Handelingh van de Noordersche Compagnie. Verslag van de reis van Willem Vermuyden, 1612. Wat recht de Engelschen pretendeeren op de walvischvangst bij Spitsbergen, met de wederlegging van Petr. Plancius. Overeenkomst tusschen Ant. Monier en Benj. Joseph, aangaande de verdeeling van den vischgrond bij Spitsbergen en verdere bijzonderheden betrekkelijk de walvischvangst, viii, 1624, Decemb., bl. 86–96. Ontdeckingen van Goenlant en Nieu-Nederlant, ix, 1625, April, bl. 43, 44. Placcaet der H. H. Staten op den haringhvanghst, teghens d' inghesetenen van Schotlandt haer wel te draeghen, ix, 1625, Mai, bl. 56, 57. Vervolgh van het ontdecken van de doorvaert in 't Noorden. Toerustinghe van een nieuwe ontdeckinghe, door Waygatz, tusschen Nova-Zembla en 't vaste landt Russien, ix, 1625, Julius. Van de Spitsberch-vaerders, met het succes van de walvischvanghers, x, 1625, Decemb., bl. 106, 107. Verhael van de reyse op Waygatz, na de Tartarische zee gedaen, alsmede van de reyse door het Fretum Davis, om daerdoor nae China te gaen. Nieuwe walrus-vangers, xi, 1626, May, bl. 57.

"Walvischvangst ghemist. De buysen verstoort. Walrusvanghen en 't seylen door Waygats ghemist, xi, 1626, Sept., bl. 131–133. Wederom-comst van de walvischvanghers, alsmede de Spitsbergh-vaerders, onder de Noortsche Compagnie, xii, 1626, Octob., bl. 8, 9. Visscherije op Spitsberghen, xvi, 1628, Novemb. Staet van Spitsberghen, xvi, 1628, Decemb."

Not seen; title and references from Bosgoed, *op. cit.*, p. 251, no. 3603. [48.]

1624. "BAUDARTIUS, W. Memoryen ofte Cort Verhael der Gedenck-weerdichste, Gheschiedenissen van Nederland, Vranckrijck, Hoogh-Duytschland, Groot Brittannyen enz. Van den jaere 1603–1624. Tweede editie grootelicx vermeerdert. Met portretten. Arnhem, Jan Jansz. 1614. 2 dln. folio.

"Zie aldaar: Enghelsche verhinderen de Hollanders in den walvisch-vanck. Boek v, bl. 43. Jacobus VI vernieuwt de questie van den harinck-vanck. xii, bl. 16. Nederlanders ende Enghelsche int gevecht om de visvangh. Misverstant tussche de Enghelsche ende Nederlanders om den walvisch-vanck. ix, bl. 97. Vier walvisschen bij den Hage (Scheveningen) gevangen. ix, bl. 97, 202."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 232, no. 3424. [49.]

1624. "LINSCHOTEN, JAN HUYGEN VAN. Voyasie, ofte schipvaert van Jan Huyghen van Linschoten, van bij Noorden om langes Noorwegen de Noordt Caep, Laplandt, Vinlandt, Ruslandt, de Wittee Zee, de Kusten van Kardenoes, Swetenoes, Pitzora, etc. door de Strate ofte Enghte van Nassouw tot voorby de Reviere Oby. Waer inne seer distinctelycken Verhaels-gewyse beschreven ende aen gewesen wordt, alle hetgene dat hem op deselve reyse van dach tot dach bejegent ende voorgekomen is. Met alle de afbeeldtsels van alle de Kusten. . . . Ghelyck als hij 't alles selfs sichtelycken ende waerachtelycken nae 't leven uyt-geworpen eñ geannoteert heeft, etc. Anno 1594 ende 1595. T'Amsterdam, by Jan Evertszen Cloppenberg. A°. 1624. folio."

"Tweede druk met gefigur. titel en 15 platen, gegraveerd door J. en B. van Doetecom. De eerste druk verscheen te Franeker bij Gerard Ketel. A° 1601. folio. Eene verkorte uitgave zag in 1663 te Amsterdam, by Saeghman, het licht. 4°. Deze twee reizen van Linschoten zijn vertaald opgenomen in: Recueil de voyages au Nord. Amsterdam, J. F. Bernard, 1731. dl. iii, bl. 1–304. Zie verder: *Tiele*, Mémoire bibliogr., bl. 190–195.

"Zie betrekkelijk de walvisschen in dezen 2n druk: Walvisschē in de haven van Toxar. Vangen een walvisch daer se 20 tonnē specks afkrijghen. Wonderlycke liefde der walvisschē met den anderē. Eene teelt van walvisschē in de haven van Toxar—"*ende is te gheloovrn, dat soomender op toeleyde, ende op versien quam, men soude daer sonder twyffel een goede visscherye afdoen.*" bl. 7. Sien veel walvisschē in de Tartarische zee. bl. 17. Vervolgens bl. 22ᵃ, 26, 31ᵇ."

Not seen; title and comment from Boegoed, *op. cit.*, p. 241, no. 3503. [50.]

1625. BAFFIN, WILLIAM. A Iournall of the Voyage made to *Greenland* with sixe *English* ships and a Pinnasse, in the yeere 1613. Written by Master *William Baffin*. <*Purchas his Pilgrimes*, iii, 1625, pp. 716–720.

Short history of the adventures and achievements of the English whaling-fleet during the year 1613. [51.]

1625. BAFFIN, WILLIAM. [Letter] To the Right Worshipfull Master Iohn Wostenholme Esquire, one of the chiefe Aduenturers for the discouerie of a passage to the North-west. [Signed, William Baffin.] <*Purchas his Pilgrimes*, iii, 1625, pp. 843, 844.

Reference to the "Grand Baye Whales" of Newfoundland, "of the same kinde which are killed at Greenland"; also to the "Sea Unicorne." [52.]

1625. [BAFFIN, WILLIAM.] A briefe and true Relation or Iournall, contayning such accidents as happened in the fift voyage, for the discouerie of a passage to the North-west, set forth at the charges of the right Worshipfull Sir *Tho. Smith* Knight, Sir *Dudly Digges* Knight, Master *Iohn Wostenholme* Esquire, Master Alderman *Iones*, with others, in the good ship called the *Discouerie* of *London*; *Robert Bileth* Master, and my self Pilot, performed in the yeere of our Lord 1616. <*Purchas his Pilgrimes*, iii, 1625, pp. 844–848.

Whale Sound (77° 30′ N. Lat.), named from the great number of whales seen in it, p. 846; many "Sea Vnicornes" seen during the voyage. The context following shows the "Relation" to have been written by William Baffin. [53.]

1625. EDGE, THOMAS. A briefe Discouerie of the Northerne Discoueries of Seas, Coasts, and Countries, deliuered in order as they were hopefully begunne, and haue euer since happily beene continued by the singular industrie and charge of the Worshipful Society of *Muscouia* Merchants of *London*, with the ten seuerall Voyages of Captaine THOMAS EDGE the Authour. <*Purchas his Pilgrimes*, iii, 1625, pp. 462–473.

First Whale-killing (year 1611), pp. 465, 466. Whaling voyages of 1612–1622, pp. 466–470. "The Description of the seuerall sorts of Whales, with the manner of killing them," pp. 470–472. "Eight seuerall kinds of Whales" are briefly described, as follows: 1. *Grand-bay*, taking his name from *Grand-bay* in *Newfoundland*" = *Balæna mysticetus*. 2. *Sarda* = *Balæna biscayensis*. 3. *Trumpa* = *Physeter macrocephalus*. 4. *Otta Sotta*—a whalebone Whale, gray in color, and "hauing finnes in his mouth all white but not aboue half a yard long"—probably *Agaphelus gibbosus*, Cope. 5. *Gibarta* = some kind of Finner Whale. 6. *Sedena*, "of a whitly colour, and bigger than any of the former, the finnes not aboue one foot long, and he

1625. **Edge, Thomas**—Continued.

yeelds little or no Oyle." **7.** *Sedena Negro* . . . "with a bumpe on h's backe" =? *Megaptera longimana*. **8.** *Sewria*, "of colour as white as snow," etc. = *Beluga catodon*.

A map (pp. 472, 473$^{\text{bis}}$) of Greenland (*i. e.*, Spitzbergen) accompanies Captain Edge's memoir, with border at sides and bottom consisting of views illustrative of the Whale and "Seamorse" fisheries. At the upper left corner is a picture of a Whale lying on its side, with the legend "A Whale is ordinarily about 60 foote longe." Immediately below this is a scene illustrating the capture of a Whale, with 4 lines of descriptive text. Below this are two others illustrating respectively the cutting in of the Whale and the trying out of the blubber, each with a descriptive legend 4 to 6 lines in length. On the right-hand border four of the five scenes depict respectively the towing of the Whale to the ships, the towing of the blubber to shore, the preparation of the fins (the legend reads: "Thus they make cleane and scrape yͤ whale fins"), and "A tent and Coopers at worke." [54.]

1625. **Fotherbye, R.** A Voyage of Discouerie to *Greenland*, &c. *Anno* 1614. Written by Ro. Fotherbye. <*Purchas his Pilgrimes*, iii, 1625, pp. 720–728.

Gives an account of the capture of Whales during the voyage. [55.]

1625. **Heley, W.,** *and others*. Diuers other Voyages to *Greenland*, with Letters of those which were there employed, communicated to mee by Master William Heley. <*Purchas his Pilgrimes*, iii, 1625, pp. 732–738.

Eleven letters, written by various persons, relating briefly to the history of Whaling by the English during the years 1617 to 1623 inclusive. [56.]

1625. "**Laet, J. de.** Nieuwe Wereldt | ofte | Beschrijvinghe | van | West-Indien, | wt veelerhande Schriften ende Aen-teeckeningen | van verscheyden Natien by een versamelt | Door | Ioannes de Laet, | Ende met Noodighe kaerten en Tafels voorsien. Tot Leyden, | In de Druckerye van Isaack Elzevier. | Anno 1625. | Met Privilegie der Ho. Mo. Heeren Staten Generael, voor 12 Jaren. | fol. pp. (2), xxii, 526. Maps.

"*See* Asher's 'Essay,' no. 1. This invaluable work was much improved in the subsequent editions and translations by the author, but the maps were unchanged."

Editio princeps. Not seen; title and comment from Sabin, *Bibl. Am.*, x, 1878, p. 15. For notice of the account of the Manatee in Laet's work, see *infrà* the Latin ed., 1633. [57.]

1625. [**Muscovy Merchants.**] A Commission for *Thomas Edge* our seruant, appointed to goe as our Factor in the Ship called the *Mary Margaret*, of the burthen of one hundred and fiftie Tunnes, for the killing of the Whale and Morses vpon the coast of *Greenland*, or any other place in the North Ocean: Giuen the 31. of March, 1611. <*Purchas his Pilgrimes*, iii, 1625, pp. 709, 710.

This is a letter of instruction issued by the "right Worshipfull Company of New Trades," or "Muscouie Merchants," as above. Among other things it directs the "procuring of sixe men of Saint *Iohn de Luz*" to act as whale-men; describes the different kinds of Whales to be sought, and their products, etc., this information being evidently based on Thomas Edge's "Description of the seuerall sorts of Whales, with the manner of killing them," as given in *Purchas*, iii, pp. 471, 472. [58.]

1625. **Poole, Jonas.** A briefe Declaration of this my Voyage of discouery to *Greenland*, and towards the West of it, as followeth: being set forth by the right Worshipfull Sir *Thomas Smith*, Gouernour of the right Worshipfull Company of new Trades, &c., written by Jonas Poole. <*Purchas his Pilgrimes*, iii, 1625, pp. 711–713.

Short history of the first English whaling voyage to "Greenland" (*i. e.*, Spitzbergen), made in the year 1611. [59.]

1625. **Poole, Jonas.** A relation written by *Jonas Poole* of a Voyage to *Greenland*, in the yeere 1612. with two ships, the one called the *Whale;* the other the *Sea-horse*, set out by the Right Worshipful the *Muscouie* Merchants. <*Purchas his Pilgrimes*, iii, 1625, pp. 713–715. [60.]

1625. [**Purchas, Samuel.**] Extracts of Gonzalo Ferdinando de Oviedo his Summarie and Generall Historie of the *Indies*. <*Purchas his Pilgrimes*, iii, 1625, pp. 970–1000.

Description of the "Manati" at pp. 987, 989. [61.]

1628. "HERNANDEZ, [F.] Rerum Medicarum Novæ Hispaniæ Thesaurus, seu Plantarum Animalium Mineralium Mexicanorum historia ex Francisci Hernandi Noui orbis medici Primarij relationibus in ipsa Mexicana vrbe conscriptis à Nardo Antonio Reccho . . . Collecta ac in ordinem digesta à Joanne Terrentio Lynceo notis illustrata; cum Indice, et Historiæ Animalium et Mineralium libro. Nunc primum in naturaliū rerū studiosor gratiā et utilitatē studio et impensis Lynceorum Publici iuris facta Philippo magno dicata. *Romæ.* M. DCXXVIIII. Ex Typographeio Jacobi Mascardi. fol. Engraved title, pp. 950, 17 l. 'Historiæ Animalium,' pp. 90 (6).

"This edition was abridged and edited from the author's MS. by Dr. Reccho, of Naples; pp. 345–455 are additions by Terrentius de Constance; pp. 460–840 by John Faber; pp. 841–899 are annotations by Fabio Colonno; the tables by Prince Cesi. Leclerc, no. 457, describes: Fabri (Joannis lyncei). Animalia Mexicana Descriptionibus, scholijq. exposita. Romæ, 1628, folio, which is merely an extract, pp. 460–840, from the foregoing."

Not seen; title and comment from Sabin, *Bibl. Amer.*, vol. viii, p. 239. See *infra* edition of 1651, for notice of cetological matter, etc. Sabin also gives (as do Carus and Engelmann) a Spanish edition, Mexico, 1615, am. 4°, translated and enlarged by Fr. Francisco Ximenez. Stevens (*Bibl. Hist.*, p. 76, no. 891) cites an edition of date 1604.

See further on Hernandez and his work, Sabin, *op. cit.*, pp. 239–241. See, also, Coues, *Bds. Col. Vall.*, p. 575. [62.]

1629. KITTENSTEYN, C. "Walvisch, gestrand by Noortwyk, 1629. Naer P. Mosijn, door *C. Kittensteyn*, br. fol."

From Bosgoed, *op. cit.*, p. 176, no. 2776. [63.]

1632. SAGARD-THEODAT, G. Le Grand Voyage | Dv pays des Hvrons, | situé en l'Amerique vers la Mer | douce, és derniers confins | de la nouuelle France, | dite Canada. | Où il est amplement traité de tout ce qui est du pays, des | mœurs & du naturel des Sauuages, de leur gouuernement | & façons de faire, tant dedans leurs pays, qu'allans en voya- | ges: De leur foy & croyance; De leurs conseils & guerres, & | de quel genre de tourmens ils font mourir leurs prisonniers. | Comme ils se marient, & esleuent leurs enfans: De leurs Me- | decins, & des remedes dont ils vsent à leurs maladies: De | leurs dances & chansons: De la chasse, de la pesche & des | oyseaux & animaux terrestres & aquatiques qu'ils ont. Des | richesses du pays: Comme ils cultiuent les terres & accom- | modent leur Menestre. De leur deüil, pleurs & lamenta- | tions, & comme ils enseuelissent & enterrent leurs morts. | Auec vn Dictionnaire de la langue Huronne, pour la commodi- | té de ceux qui ont à voyager dans le pays, & n'ont | l'intelligence d'icelle langue. | Par F. Gabriel Sagard Theodat, Recollet de | S. François, de la Prouince de S. Denys en France. | — | A Paris, | Chez Denys Moreav, ruë S. Iacques, à | la Salamandre d'Argent. | — | M. DC. XXXII. | Auec Priuilege du Roy. 1 vol. 16°. ll. 12 (= eng. title, 1 l.; plain title, 1 l.; invocation to Jesus Christ, 2 ll.; to Henry de Lorraine, 2 ll.; to reader, 3 ll.; contents and royal privilege, &c., 3 ll), pp. 1–380. Dictionaire de la Langve Hvronne, ll. 80.

Des Baleines, pp. 24–27; Marsoins blancs (= *Beluga catodon*), pp. 51, 52.

There is a late textual reprint of this rare work, published in 1865, "giving fac-simile of the original title-pages, indication of the original pagination, etc." [64.]

1633. LAET, J. DE. Novvs Orbis | seu | Descriptionis | Indiæ Occidentalis | Libri XVIII. | Authore | Joanne de Laet Antwerp. | Novis Tabulis Geographicis et variis | Animantivm, Plantarum Fructunmque | Iconibus illustrati. | Cum Privilegio. | Lvgd. Batav. apud Elzevirios. A°. 1633. fol. ll. 15 (incl. engr. title-page), pp. 1–104, 205–690, ll. 9. Maps and cuts.

Manati, p. 6, fig. The account occupies nearly a page; the figure is a copy from Clusius. [65.]

[1634?] SEGERSZ VAN DER BRUGGE, JACOB. "Journael, of Dagh-Register, gehouden by Seven Matroosen, in haer Overwinteren op Spitsbergen in Maurits-Bay, Gelegen in Groenlandt, t' zedert het vertreck van de Visschery-schepen der Geoctroyeerde Noordtsche Compagnie, in Nederlandt, zijnde den 30 Augusty, 1633 tot de wederkomst der voorsz. schepen, den 27 May, Anno 1634. Beschre-

[1634?] Segersz van der Brugge, Jacob—Continued.
ven door den Bevelhebber Jacob Segersz van der Brugge. t' Amsterdam, Gedruckt By Gillis Joosten Saeghman. (z. j.) 4°. [*Circa* 1634.]

"Het verhaal van de Overwinteringen in 1633 en 1634 vindt men verkort in: (Is. de la Peyrère), Nauwkeurige Beschrijvingh van Groenland. Amsterdam, 1678. 4°. bl. 114–122. Tevens wordt van het bovengenoemde journael van Segersz een uittreksel gevonden in: De Walvischvangst, ii, bl. 26–36."

Not seen; title and remarks from Bosgoed, *op. cit.*, p. 289, 346; no. 3491. [66.]

1635. Nieremberg, J. E. Ioannis Evsebii Nierembergii | Madritensis ex Sociatate Iesv | in Academia Regia Madritensi | Physiologiæ Professoris | Historia | Naturæ, | Maxime peregrinæ, | Libris xvi. Distincta. | In quibus rarissima Naturæ arcana, etiam astronomica, & | ignota Indiarum animalia, quadrupedes, aues, pisces, | reptilia, insecta, zoophyta, plantæ, metalla, lapides, & | alia mineralia, fluuiorumq̃ue & elementorum condi- | tiones, etiam cum proprietatibus medicinalibus, descri- | buntur; nouæ & curiosissimæ quæstiones disputantur, ac | plura sacræ Scripturæ loca erudité enodantur. | Accedunt de miris & miraculosis Naturis in Europâ Libri duo: | item de iisdem in Terrâ Hebræis promisâ Liber unus. | [Vignette.] Antverpiæ, | ex Officina Plantiniana Balthasaris Moreti. | M. DC. XXXV. 2°. ll. 4, pp. 1–502, ll. 50. Figs. num. in text.

Caput lix. De balænis pugnacibus, p. 261; caput lx (pp. 262–263), De piscatione balænarum. Contains a figure of a male Cachalot lying on the side and showing ventral surface—from Clusius, many times copied by later compilers; also, a figure of a fabulous creature, from Clusius, suggestive in some respects of the Cachalot, the two figures bearing the legend *Cete admiribilis formæ.* [67.]

1636. Sagard Theodat, G. Histoire | du Canada | et | Voyages que les freres | Mineurs Recollects y ont faicts pour | la conuersion des infidelles | divisez en quatre livres | Où est amplement traicté des choses principales ar- | riuées dans le pays depuis l'an 1615 iusques à la pri- | se qui en a esté faicte par les Anglois. Des biens & | commoditez qu'on en peut esperer. Des moeurs, | ceremonies, creance, loix, & coustumes merueil- | leuses de ses inhabitans. De la conuersion & baptes- | me de plusieurs, & des moyés necessaires pour les amener | à la cognoissance de Dieu. | L'entretien or- | dinaire de nos Mariniers, & autres particularitez | que se remarquent en la suite de l'histoire. | Fait & composé par le | F. Gabriel Sagard, | Theodat, Mineur Recollect de la Prouince de Paris. | — | A Paris, | Chez Clande Sonnius, ruë S. Jacques, à l'Escu de | Basle, & au Compas d'or. | — | M. DC. XXXVI | Auec Priuilege & Approbation. sm. 8°. pp. 1–1005, ll. 22.

Marsoins, pp. 118, 124, 135. Des Baleines, pp. 130–133. Marsoin blanc, p. 1577.

A textual reprint of this rare work, in 4 vols., 12°, Paris, appeared in 1866. [68.]

1640. Laet, J. de. L'Histoire | dv | Nouveau Monde | ou | Description | des Indes | occidentales, | Contenant dix-huict Liures, | Par le Sieur Jean de Laet, d'Auuers; | Enrichi de nouuelles Tables Geographiques & Figures des | Animaux, Plantes & Fruicts. | [Vignette.] A Leyde, | Chez Bonauenture & Abraham Elseuiers, Imprimeurs | ordinaires de l'Vniuersité. | — | CIↃ IↃC XL. fol. ll. 18, pp. 1–632, ll. 6.

Le Manati, p. 6, fig. [69.]

1646. Albertz. van Raven, Dirk. "Journael ofte Beschrijvinge van de reyse ghedaen bij den Commandeur Dirk Albertsz. Raven, nae Spitsberghen, in den jare 1639, ten dienste vande E. Heeren Bewindt-hebbers van de Groenlandtsche Compagnie tot Hoorn. Waer in verhaelt wordt sijn droevighe Schipbrencke, syn ellende op 't wrack, en syn blijde verlossinge. Met noch eenighe ghedenckweerdige Historien. Alles waerdigh om te lesen. Tot Hoorn. Gedruckt by Isaac Willemsz. Voor Ian Iansz. Deutel. Ao. 1646. 4°. Met eene plaat.

"Hierbij zijn gevoegd nog drie Reisjournalen naar het Noorden, en wel van: Andries Jansz. van Middelburgh in 1634; van Raven in 1633; van Pieter Jansz. Pickman in 1616. Het

1646. ALBERTZ. VAN RAVEN, DIRK—Continued.

Journaal van Raven vindt men gewoonlijk als appendix achter het Iournael van de Oost Indische Reyse van Willem IJsbrantsz. Bontekoe. Hoorn. 4°. Het is ook opgenomen in: *Hulsius* Sammlung von 26 Schiffahrten. Neurnberg, 1598–1640."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 240, no. 3492. [70.]

1647. LA PEYRÈRE, ISAAC DE. Relation | dv | Groenland. | [Par Isaac de La Peyrère.] [Vignette.] A Paris, | Chez Avgvstin Covrbe, dans la | petite Salle dv Palais, à la Palme. | — | M. DC. XLVII. | Auec Priuilege dv Roy. sm. 8°. ll. 8, pp. 1–278, ll. 2. Map and pll.

For notice of cetological matter see *infra*, ed. of 1663. [71.]

1648. ANON. "Kort verhael uyt het journael van de personen die op Spitsbergen in 't overwinteren, gestorven zijn. Anno 1634. Gedrukt te Hoorn, 1648. "Behoort bij het Journaal van D. Alb. Raven."

Not seen; title from Bosgoed, *op. cit.*, p. 249, no. 3576. *See* 1646. RAVEN, D. A. [72.]

1648. "GUICCIARDINI, L. Belgium, dat is: Nederlandt, ofte Beschryvinge derselviger provincien ende steden. Met veel bijvoegselen, landcaerten en de afbeeldinge der steden. Amsteld., J. Jansonius, 1648. 2°.

"Walvisschen, p. 302*a*."

Not seen; title from Bosgoed, *op. cit.*, p. 70, no. 1100. [73.]

1650. JONSTON, J. Historiæ Naturalis | De Piscibus et Cetis | Libri V. | Cum æneis figuris | Iohannes Ionstonus Med. Doctor | conciñanit. | Francofvrti ad Moenum | Impensà | Matth[æi] Meriani. [Seal.] [No date. Engraved title-page.] 2°. pp. 1–228, pll. i–xlvii.

Historiæ Naturalis | De | Exangvibus | Aqvaticis | Libri IV. | Cum figuris æneis | Joannes Jonstonus | Med. D. concinnavit. | [Seal.] Francofvrti | ad | Moenvm, | Impendio | Matthæi Meriani. | — | M DC L. pp. 1–78, pll. i–xx.

The work is in two parts, with separate pagination and notation of plates, and the two title-pages above transcribed. The index to the two series of plates is on one page, and the general index to the two parts is partly on the same leaf. The first title-page is without date; the second is dated M. DC. L., ostensibly the date of publication of the whole work.

Liber v. De Cetis (= *Cetacea*+*Sirenia* et *Pinnipedia*), pp. 213–224, pll. xli–xliv. Capvt i, De Cetis in genere, pp. 213, 214. Capvt ii, De Cetis in specie. Articulus i, De Balæna, pp. 215, 216, pll. xli, xlii; Articulus ii, De Balæna vulgi, & Physetere, pp. 216, 217; Articulus iii, De Puste & Orca, pp. 217, 218, pl. xliii; Articulus iv, De Delphino, pp. 218–220, pl. xliv; Articulus v, De Phocæna & Scolopendra Cetacea, pp. 220, 221, pl. xli; Articulus vi, De Phoca, seu Vitulo marino, pp. 221–223, pl. xli; Articulus vii, De Manati Indorum, pp. 223, 224, pl. xliii.

Pl. xli, 5 figg.: upper, "Balæna—Wallfisch" = *Physeter macrocephalus;* second fig., "Balæna—Wallfisch" = *Physeter macrocephalus*, from Clusius; middle fig., "Balæna Monstrosa" (teeth in lower jaw, and some other features of *Physeter*, of which it may be a gross caricature); fourth fig., "Balæna—Ein ander art Wallfisch," apparently based on the Orca, but the pectoral limbs terminate in curved claws; last fig., "Phocæna—Meer Schwein, Braunfisch" = *Phocæna*. Pl. xlii: "Balæna. Ein Grosser Wallfisch von 60 Schuch lang vnd 41 Schuch hoch," a full-page figure, with scenery, of an unmistakable *Physeter macrocephalus*, lying on its side. Pl. xliii, 7 figg.: upper fig., "Vtilis Piscis serram ad instar Pristis habens"—a fabulous creature, with the sword of a saw-fish (*Pristis*) protruding from the top of the head; second fig., "*Delphinus* prior, Delphin" (not determinable); third fig., "Delphinus alter, Delphin" (probably an *Orca*); fourth and fifth figg., "Antiq. Metal.," obverse and reverse of an ancient coin or medal, on one rude effigies of two Dolphins; sixth fig., "Delphinus fœmina, Delphin Weiblein" = *Phocæna*, with a young one attached by the fœtal envelopes; seventh fig., "Delphinus alius, Ein ander art Delphin" = Common Dolphin. Pl. xliv, 8 figg.: upper fig., "Caput Delphini, Delphins Kopf" = *Phocæna;* second fig., "Gladius piscis Serræ, Der Kopf des Schwertfisch," skull of Pristis; third fig., "Scolopendra cetacea," a fabulous creature with some features of a Cetacean; fourth fig., "Phoca sine Vitulus marinus, Seehund," Seal; fifth fig., "Vitulus, Seehundt," Seal; sixth fig., "Rosmarus, Wallross"; seventh fig., "Rosmarus Vetus, Ein Alt Meer Ros"; and eighth fig., "Rosmarus juuencus, Ein Iung Meer Ros," from the well-known figure published by Gerard. In the article "De Manati Indorum" there is a reference to "Tab. xliii," but there is no corresponding figure on the plate.

None of the figures are original, most of them being copies from Belon, Rondelet, Olaus Magnus, Gesner, etc. [74.]

1651. **Albertus Magnus.** Beati | Alberti | Magni, | Ratisbonensis Episcopi, | ordinis prædicatorvm, | de Animalibvs Lib. XXVI. | Recogniti per R. A. P. F. Petrvm Iammy, sacræ Theologiæ Doctorem, Conuentus | Gratianopolitani, eiusdem Ordinis. | Nvnc primvm in lvcem prodevnt. | Operum Tomus Sextus. | [Vignette.] Lvgdvni, |

Sumptibus
Clavdii Prost.
Petri & Clavdii Rigavd, Frat.
Hieronymi Delagarde.
Ioan. Ant. Hvgvetan.
Via Mercatoria. |

M. DC. LI. | Cvm privilegio Regis. fol. ll. 8, pp. 1–684.

Liber xxiv. De natura natatilium primo in communi, & consequenter in speciali, pp. 645–661. De cetu, pp. 650, 651. De delphino, pp. 653, 654. De gladio, p. 655. De monocerote, pp. 657. [75.]

1651. **Hernandez, F.** Nova | Plantarvm, Animalivm | et Mineralivm Mexicanorvm | Historia | a Francisco Hernandez Medico | In Indijs præstantissimo primum compilata, | dein a Nardo Antonio Reccho in volvmen digesta, | a Io. Terentio, Io. Fabro, et Fabio Colvmna Lynceis | Notis, & additionibus longe doctissimis illustrata. | Cui demum accessere | aliqvot ex principis Federici Cæsii Frontispiciis | Theatri Naturalis Phylosophicæ Tabulæ | Vna cum quamplurimis Iconibus, ad octingentas, quibus singula | contemplanda graphice exhibentur. | [Vignette.] | Romae MDCLI. | Sumptibus Blasij Deuersini, & Zanobij Masotti Bibliopolarum. | Typis Vitalis Mascardi. Superiorum permissu.

[*Or,*] Rervm Medicarvm | Novæ Hispaniæ | Thesavrvs | sev | Plantarvm Animalivm | Mineralivm Mexicanorvm | Historia | ex Francisci Hernandez | Noui Orbis Medici Primarij relationibus | in ipsa Mexicana Vrbe conscriptis | a Nardo Antonio Reccho | Monte Coruinate Cath. Maiest. Medico | Et Neap. Regni Archiatro Generali | Iussu Philippi II. Hisp. Ind. etc. Regis | Collecta ac in ordinem digesta | À Ioanne Terrentio Lynceo | Constantiense Germᵒ. Phũ. ac Medico | Notis Illustrata | Nunc primũ in Naturaliũ rer. Studiosor. gratiã | lucubrationibus Lynceorũ publici iuris facta. | Quibus Jam excussis accessere demum alia | quor. omnium Synopsis sequenti pagina ponitur | Opus duobus voluminibus diuisum | Philippo IIII. Regi Catholico Magno | Hispaniar. vtriusq; Siciliæ et Indiarũ etc Monarchæ | dicatum. | Cum Priuilegijs. Romæ Superior. permissu. Ex Typographeio Vitalis Mascardi. M. DC. XXXXXI. fol. ll. 9 [= ill. title (the one first given above), engr. title (the second given above), dedic. to the reader, index], pp. 1–950, l. 1, pp. 1–90, ll. 3 [= index and errata], ll. 10 [gen. index, index of authors, errata, and corregenda]. The leaves containing the general index, etc., here placed at the end of the volume, are in some copies bound in at the front of the general text. The "Historiæ Animalivm et Mineralivm Novae Hispaniae . . . Francisco Fernandez Philippi Secundi primario medico avthore" (pp. 1–90+ll. 3) is also similarly transposed in binding.

There are earlier editions, none of which I have been able to see: the collation of that of 1628 (*q. v.*) has been already given, copied from Sabin. On Hernandez and his works see Rich, *Books relating to America*, 1493–1700, pp. 72–74.

The matter of special interest in the present connection is: De Manati, Nardi Ant. Recchi, ix, cap. xiii, pp. 323, 324, 2 figg.

About ⅔ p. of text, and 2 cuts, one in profile, the other from above, scarcely recognizable as having any relation to the Manati: body elliptical, tail broad and rounded, with a ring at base; head in profile, *sui generis;* from above, somewhat calf-like; fore-limbs quite long, feet hoofed, and of a bovine form, especially as seen in the profile figure. The characters given by the artist do not conform to those in the text, which is, compared with other early accounts, not remarkable for accuracy.

Ambra grisea seu odorata, Io. Fabri Lyncei Expos., pp. 564–579. A long disquisition about Ambra grisea, its nature, origin, and medicinal properties, etc., with references *passim* to Balænæ. [76.]

1652. **Anon.** "De Vrye Zee, aengaede haere vryheyt in 't varen en visschen voor de Veeren Nederlanden, verdedigt tegen alle bestryders der Gerechticheyt, insonderheyt teghen die hedendaechsche Regeringe in Engeland. [No place.] 1652. 4°."

"Pp. 55–62 treat of the Herring- and Whale-fishery and the pretensions of the English on Greenland and Spitzbergen."

Not seen; title and comment from Fr. Muller, *Cat. Amer. Books*, 1877, p. 200, no. 3424. [77.]

1655. "N. N." America: | or | An Exact Description | of the | West Indies: | More especially of those | Provinces which are under | the Dominion of the | King of Spain. | — | Faithfully represented by N. N. Gent. | — | London, printed by Ric. Hodgkinsonne for Edw. Dod, | and are to be sold at the Gun in Ivy-lane, 1655. sm. 8° by sig. ll. 7, pp. 1–484, l. 1, map.

The Manati or Oxe-fish, pp. 154, 155. Account based mainly on Hernandez and Laet. [78.]

1655. **Worm, Olaus.** Museum Wormianum. | Seu | Historia | Rerum Rariorum, Tam-Naturalium, quam Artificialium, tam Domesticarum, | quam Exoticarum, quæ Hafniæ Danorum in | ædibus Authoris servantur. | Adornata ab | Olao Worm, med. doct. | &, in Regiâ Hafniensi Academiâ, olim | Professore publico. | Variis & accuratis Iconibus illustrata. | [Vignette.] Lugduni Batavorum, | Apud Johannem Elsevirivm, Acad. Typograph. | — | CIↄ IↄC LV. 2°. ll. 9, pp. 1–390, l. 1. Cuts in text.

Cap. xiii, De Cetis, pp. 279, 280; cap. xiv, De Ceto dentato, Balenâ, Monocerote, pp. 280–287; cap. xv, De Delphino, Pristi, Phocâ, Rosmaro, pp. 288–290. Skull of Narwhal figured, three views, and a view of the tusk separate, pp. 283–285; also a grotesque figure of the animal, p. 282.

Cap. xiii, De Cetis, consists mainly of a briefly descriptive list of Whales from the celebrated Icelandic manuscript "Specvlum regale," numbering 22 species. (*Cf.* Eschricht and Reinhardt, "Om Nordhvalen," 1861, p. 39, and the English translation, "Memoirs on Cetacea," Ray Society, 1866, p. 32.) The account and figures of the Narwhal are from the MSS. of D. Thorlacus Sculonius. [79.]

1657. "**Bartholinus, Th.** Cetorum genera."

"Zie: *Th. Bartholinus*, Historia Anatom., cent. iv, 1657, pp. 272–285."

Not seen; from Bosgoed, *Bibl. Ichthyol. et Piscat.*, p. 157, no. 2477. [80.]

1657. **Jonston, John.** An | History | of the | Wonderful Things of Nature: | Set forth in Ten severall Classes. | Wherein are contained |

I. The Wonders of the Heavens.
II. Of the Elements.
III. Of Meteors.
IV. Of Minerals.
V. Of Plants.
VI. Of Birds.
VII. Of Four-footed Beasts.
VIII. Of Insects, and things wanting blood.
IX. Of Fishes.
X. Of Man.

| — | Written by Johannes Jonstonus. | And now Rendred into | English, | by | A Person of Quality [John Rowland]. | — | London, | Printed by John Streater, living in Well-Yard near the Hospitall of | St. Bartholomew's the Lesse, and are to be sold by the Book- | Sellers of London, 1657. 8°. 8 ll., pp. 1–344.

Classis ix, chap. iii, of the Whale and Barbel, pp. 290, 291. Chap. xi, of Manaty, and the Whiting, pp. 296, 297. Chap. xii, of Mirus, Mola, and Monoceros, pp. 297–298. [81.]

1658. "**Rochefort, C. de.** Histoire | Naturelle et morale | des | Iles antilles | de l'Amerique. | Enrichie de plusieurs belles figures des Raretez les plus | considerables qui y sont décrites. | Vvec vn Vocabulaire Caraïbe. | [Dessin.] | A Roterdam, | Chez Arnould Leers, | — | M. DC. LVIII. 1 vol. 8° (or sm. 4°). Engr. title, 8 prel. pp. incl. regular title, pp. 1–527, 6 ll. (contents).

This is the original ed. Not seen; title from Coues, *Bull. U. S. Geol. and Geogr. Surv. Terr.*, v, no. 2, Sept. 6, 1870, p. 240. For Cetacean matter, etc., see second ed., 1665. Also, the Dutch version, 1662. [82.]

1660. Herrara, A. de. Histoire | generale | des Voyages | et Conqvestes | des Castillans, dans les Isles & Terre-ferme | des Indes Occidentales. | Traduite de l'Espagnol d'Antonio d'Herrara, Historiographe de sa | Maiesté Catholique, tant des Indes, que des Royaumes de Castille. | Par N[icolas]. de la Coste. | Premiere Decade, contenant les Pre- | . . . [=etc., 7 lines]. | A Paris, | Chez Nicolas & Iean de la Coste, au Mont Saint Hilaire, à | l'Escu de Bretagne; et en leur boutique, à la petite porte | du Palais, qui regarde le Qay des Augustins. | — | M. DC. LX. Avec Privilege dv Roy. 3 vols. 4°. 1660–61.

Du poisson apellé Manati [*sic*], tome i, pp. 378, 379. [83.]

1660. Jo[n]ston, J. Naeukeurige beschryving van de natuur der viervoetige dieren, der vissen en bloedloze waterdieren, der vogelen, der gekerfde of kronkeldieren, slangen en draken, neffens haar beeldnissen. Uit het Latyn vertaeld door *M. Grausius.* Amsterdam, Schipper, 1660. fol. Met 249 koperen platen."

Not seen; title from Bosgoed, *op. cit.*, p. 10, no. 108. [84.]

1662. Rochefort, C. de. Natuurlyke en zedelyke | Historie | van | d'Eylanden | de Voor-Eylanden | van Amerika. | Verrijkt met vele schoone Platen, die uytbeelden d' aller-aan- | merkelijkste seldsaamheden die'er in beschreven zijn. | Met eenen Caraïbaanschen Woorden-schat. | Door D. Charles de Rochefort voor desen Bedienaar | des H. Euangeliums in d' Eylanden van Amerika, en tegenwoor- | digh Herder van de Kerke der Françoysche Tale tot Rotterdam. | Vertaalt in Nederduytsch door H[eiman]. Dullaert. | Alles na een Voorschrift door de Schrijver oversien | en veel vermenighvuldight. | [Vignette.] Tot Rotterdam, | By Arnout Leers, Boekverkooper. | M. DC. LXII. sm. 4°. ll. 20 (incl. engr. title and plain title), pp. 1–475, ll. 5½ (contents). (The copy examined lacks the folding plates of the French ed. of 1665, but appears to have all the others.)

XVII. Hooft-stuk: Van de Zee-gedrochten die in dese gewesten gevonden worden, pp. 151–159. Van de Marsoüins, of Zee-verkens, p. 152. Van den Lamantin, pp. 155, 156. Van de Walvisschen, en andere Zee-gedrochten, p. 156. XVIII. Hooft-stuk: Bysondere beschrijving van eenen Zee-Een-hoorn, die strande op de Rheede van het Eyland van de Schild-padde in het jaar 1644, etc., pp. 159–177. XX. Hooft-stuk: Van den Ambergrijs; Van sijnen oorspronk, en van de teykenen des genen die goed is, en sonder vermengeling, pp. 190–194.

For comment on the cetological matter, etc., see the French ed. of 1665. [85.]

1663. La Peyrère, Isaac de. Relation | dv | Groenland. | [Par Isaac de La Peyrère.] [Vignette.] A Paris, | Chez Lovis Billaine, au second | pillier de la grand' Salle du Palais, à la | Palme, & au grand Cesar. | — | M. DC. LXIII. | Avec Privilege dv Roy. ll. 9, pp. 1–278, ll. 2. Map and pll.

References to the Narwhal (le Licorne) and to Whales *passim*, but especially to the former at pp. 192, 193, and to the latter at pp. 220–223. The plate facing p. 145 gives a figure of the Narwhal (animal) and three views of the skull, evidently after Worm.

This appears to be a reissue, with a different imprint, of the edition of 1647 (*ed. prin.*, *q. v.*). There is a Dutch translation (Hoorn, 1678), and a German (Nürnberg, 1679). It is also given in English by Churchill (Coll. Voy.), and by the Hakluyt Society (Coll. Doc. on Spitz. and Greenl., pp. 175–249). The cetological matter is unimportant. [86.]

1664. Boucher, P. Histoire | veritable | et | Natvrelle | des | Moevrs et Prodvctions | dv Pays | de la | Novvelle France. | Vvlgairement dite | le | Canada. | [Par Pierre Bouchet.] [Ornament.] A Paris, | Chez Florentin Lambert, ruë | Saint Iaques, vis à vis Saint Yues, | à l'Image Saint Paul. | — | M. DC. LXIV. | Auec Permission. 12°. ll. 12, pp. 1–168.

Noms des Poissons qui se trouuent dans le grand Fleuue S. Laurens, & dans les lacs & riuieres qui descendent, dont nous auons connoissance. Chap. vii, pp. 74–87. Marsoin blanc [= *Beluga catodon*], pp. 74, 75. "On en void des quantitez admirables, depuis Tadoussac jusques à Quebec, qui bondissent sur la riuiere" (p. 75). [87.]

1664. Zesen, Filips von. "Beschreibung der stadt Amsterdam, darinnen von derselben ersten ursprunge bis auf gegenwärtigen Zustand, ihr unterschiedlicher anwachs, herliche vorrechte, und in mehr als 70 Kupferstükken entworfene führnemhste Gebeue, zusamt ihrem Stahtswesen, Kauf-handel und ansehnlicher macht zur See, wie auch was sich in und mit Derselben märkwürdiges

1664. Zesen, Filips von—Continued.
zugetragen vor augen gestellet werden. Zu Amsterdam, Gedrukt und verlegt durch Joachim Noschen. Im Jahr 1664. 4°."

"Zie aldaar: Fischmärkte, bl. 226, 227–231, benevens eenige bijzonderheden omtrent den verkoop van visch. Grühnländische Geselschaft, was vor freiheit sie habe, bl. 359. Grühnländische Pakheuser, bl. 358. Walfische, wie sie gefangen und der trahn daraus gesotten wird, bl. 359. Härings-Pakkerei und Pakker-turn, bl. 76, 103, 172.

Not seen; title and references from Bosgoed, *op. cit.*, p. 253, no. 3613. [88.]

1665. Anon. Of the New *American* Whale-fishing about the *Bermudas.* <*Philos. Trans. Lond.*, i, no. 1 [1665], pp. 11–13. [89.]

1665. [Rochefort, C. de.] Histoire | naturelle et morale | des | Iles Antilles | de l'Amerique. | Enrichie d'un grand nombre de belles Figures en taille douce, | des Places & des Raritez les plus considerables, | qui y sont décrites. | Avec un Vocabulaire Caraïbe. | Seconde edition. | Reveuë & augmentée de plusieurs Descriptions, & de quelques | éclaircissemens, qu'on desiroit en la precedente. | [Par César de Rochefort.] [Dessin.] | A Roterdam, | Chez Arnout Leers, | — | M.DCC.LXV. sm. 4°. 18 ll. (incl. eng. title and plain title), pp. 1–583, ll. 6½ (contents), 3 fold. pll., and numerous cuts of plants and animals.

Chapitre xvii. Des Monstres Marins qui se trouvent en ces quartiers, pp. 190–200. [Contenant entre autres], Des Marsoüins, p. 191; Du Lamantin, pp. 194, 195, fig., p. 199; Des Baleines & autres Monstres de Mer, p. 195.

Chap. xviii. Description particuliere d'une Licorne de Mer, qui s'echoua à la rade de l'Ile de la Tortuë en l'an 1644. Avec un recit curieux, par forme de comparaison & de digression agreable, touchant plusieurs belles & rares cornes qu'on a apportées depuis peu du détroit de Davis; & de la qualité de la terre, & des meurs des Peuples qui y habitent, pp. 200–220, 2 figs., p. 204.

Chap. xx. De l'Ambre gris; De son Origine & des marques de celuy qui est bon, & sans mélange, pp. 236–241.

The remarks about Marsouins and Baleines are brief and of no importance. The account of the Lamantin (1 page and 3 lines in length) is explicit and interesting, describing correctly the general appearance and habits of the animal, including its reproduction, and the use of its flesh as food by the natives. The cut (p. 199) is a very good figure (its date, of course, considered) of the animal—an old Lamantin folding its young one in its arms. The account of the Licorne de Mer (pp. 200–202), said to have been stranded "au rivage de l'Ile de la Tortuë, voisine de l'Ile Hispaniola, ou Saint Domingue," is given in the words of M. du Montel, who saw it. It was about 18 feet long, its body of the size of a barrel. It had 6 large fins—2 placed "au defaut des ouyës," the other 4 on the sides of the belly at equal distances. The body was covered with large scales; therefore, whatever it may have been, it was not a Cetacean. The horn projecting from the front of the horse-like head was 9½ feet long. The horn was preserved for two years, and finally carefully boxed and shipped by the governor of the island, as a present, to "Monsieur des Traucarts, Gentilhomme de Saintonge," but, alas, the vessel was wrecked on the passage, and this precious relic was lost, as well as all the merchandise. Following this relation is a short account of the Narwhal with (on page 204) "les figures de la Licorne laquelle s'echoüa en l'Ile de la Tortuë, & d'une de celles du Nord," to show how great is the difference between the two species.

In the chapter on Ambergris, after stating the fact that it was unknown to the ancients, and the various theories respecting its origin, the author observes: "Mais c'est plus vrai-semblablement une sorte de Bitume, qui s'engendre au fond de la mer," etc., and proceeds to give his view of how it may be detached, etc. The whole account is one of special interest in relation to the early history of Ambergris.

For the original edition of this work, *see* Rochefort, at 1658. There is also a later ("derniere") edition (Rotterdam, 1681), of which Dr. Coues has recently given the collation (*Bds. Col. Vall.*, p. 241). An English translation was published in London in 1666 (not seen by me), and a Dutch in 1662, *q. v.* [90.]

1666. Anon. A Further Relation of the *Whale-fishing* about the *Bermudas*, and on the Coast of *New-England* and *New-Netherland.* <*Philos. Trans. Lond.*, i, no. 8 [1666], pp. 132, 133. [91.]

1667. "Merrett, C. Pinax | Rerum Naturalium | Britannicarum, | continens | Vegetabilia, Animalia, | et | Fossilia, | In hac Insula reperta inchoatus. | — | Authore | Christophoro Merrett, | Medicinæ Doctore utriusque Societatis | Regiæ Socio primoque Musæi Har- | veani Custode. | — | *Μὴ τῷ λόγῳ μοῦνον ἀλλὰ* | *ἔργῳ δεῖ νομίζεσθαι τοὺς ἰήτρους.* Hipp. | — | Londini, | — | Typis T. Rov-

1667. "MERRETT, C.—Continued.

croft, Impensis Cave Pulleyn. | MDCLXVII. Vol. unic. 16mo. Tit. 1 f. Epist. dedic., 5 f. Epist. ad Lect., 10 f. pp. 1–223+1."

"Edit. altera. Ed. princeps 1666. Ed. nova 1704."

Not seen; title from Coues, *Proc. U. S. Nat. Mus.*, ii, 1880, p. 361. The work is also cited by Bosgoed, *op. cit.*, p. 102, no. 1619. [92.]

1667. NORWOOD, R. An Extract Of a Letter, written from the *Bermudas*, giving an account of the Course of the Tides there, of *Wells* both *Salt* and *Sweet*, digg'd near the Sea; of the *Whale-fishing* there practised anew, and of such *Whales*, as have *Sperma Ceti* in them. <*Philos. Trans. Lond.*, no. 29 [1667], pp. 565–567. [93.]

1667. TERTRE, [J. B.] DU. Histoire | generale | des | Antilles | habitées par les François. | Tome ii. | Contenant l Histoire | natverelle, | Enrichy de Cartes & de Figures. | Par le R. P. [Jean Baptiste] dv Tertre, de l'Ordre FF. Prescheurs, | de la Congregation de S. Louis, Missionnaire Apostolique | dans les Antilles. | [Arms.] A Paris, | Chez Thomas Iolly, au Palais, en le Salle des Merciers | à la Palme, | & aux Armes d'Hollande. | — | M. DC. LXVII. | Avec Privilege. 4°. [3 vols., 4°. Vol. i, vol. ii, 1667; vol. iii, 1671.]

Vol. ii, Traite iv. Des Poissons. Chap. i. Des Poissons de la mer, pp. 195–233.—§ i. Des Baleines, pp. 196–198. § ii. Des Souffleurs, pp. 198, 199. § iii. Du Lamantin ou Manaty, pp. 199–209, fig. (pl. fac. p. 195). The remarks about the "Baleines" and "Souffleurs" are very general and of little importance. The account of the Manatee is more detailed, treating of its external characters, habits, products, and capture. The figure is like Laet's, which is a copy from that of Clusius, *q. v.* [94.]

1668. STAFFORD, R. Of a Letter, written to the *Publisher* from the *Bermudas* by Mr. *Richard Stafford;* concerning the Tydes there, as also Whales, *Sperma Ceti* ... <*Philos. Trans. Lond.*, iii, no. 40 [1668], pp. 792–795. [95.]

1669. "MONTANUS, ARN. Gedenkwaerdige Gezantschappen der Oost-Indische maatschappy, aen de Kaisaren van Japan. Vervaetende wonderlijke voorvallen op de togt der Nederlandsche gezanten. Beschryving van dieren, gewassen enz. t' Amsterdam, by Jacob van Meurs, 1669. fol. Met gegrav. platen en kaarten."

"Zie aldaar: Beschryving der walvisschen en der walvischvangst, bl. 448, 449. Japansche visschers, haer manieren van visschen. Met afbeelding, bl. 55 en 279."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 169, no. 2675. [96.]

1670. BARTHOLINUS, THOMAS. De Sirene Danica. <*Ephem. Med.-phys. Germ. Acad. Nat. Curios.*, i, 1670, pp. 85–89; edit. secund., 1684, pp. 73–79. [97.]

1670. "NIEUHOF, JOAN. Het Gezantschap der Nêerlandsche Oost-Indische Compagnie, aen den grooten Tartarischen Cham, den tegenwoordigen Keizer van China. Waerin de gedenkwaerdighste geschiedenissen. Beneffens beschryving der dieren, gewassen, enz. Verçiert met over de 150 afbeeltsels. t' Amsterdam, by Jacob van Meurs, A°. 1670. fol."

"Zie aldaar, Visschen: De walvisch, haar gestalte en teelt; hoe zy gevangen worden, bl. 157*a*–160*a*. Vliegende visschen. Met afbeelding, bl. 203, 204."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 170, no. 2682. [98.]

1670. SCILLA AGOSTINO. La | Vana Specvlazione | disingannata | dal Senso. | Lettera risponsiva | Circa i Corpi Mariné, che Petrificati si trouano | in varij luoghi terrestri. | Di Agostino Scilla Pittore | Accademico della Fvcina, | detto lo Scolorito. | Dedicata | all' illvstrissimo Signore, | il Signor | D. Carlo Gregori | Marchese di Poggio Gregorio, | cavaliero della Stella | — | In Napoli, | Appresso Andrea Colicchia. M. DC. LXX. | Con licenz a de' Superiori. 4°. ll. 5, pp. 1–168, pll. i–xxviii+frontisp.

At page 123 is a description of a fragment of a lower jaw containing three teeth; the fragment is figured, pl. xii, fig. 1. The teeth are recognizable as those of *Squalodon*. (*Cf.* VAN BENEDEN, "Recherches sur les Squalodonts," in *Mém. de l'Acad. roy. de Belgique*, vol. xxxv, 1865.)

The work thus has the importance of containing the first unquestionable description and figure of remains of Squalodonts. [99.]

1671. "Martinière, P. M. de la. Voyage des pays septentrionaux. Dans lequel se voit les moeurs, manière de vivre et superstitions des Norwéguiens, Lappons, Sybériens, Samojèdes, Zembliens, Islandois. Paris, 1671. kl. 8°. Met fig."

"Herdrukken verschenen te Parjis, 1676. 8°, en te Amsterdam, 1708 (zonder naam van den schrijver). Eeene engelsche vertaling: London, 1674; eene hoogduitsche: Hamburg, 1675, en Leipzig, 1711; eene italiaansche in 1683. Zie voor de Hollandsche uitgave: De Noordsche Weereld ... [Zie 1685. Martinière en Martens.] Adelung geeft in zijn: 'Geschichte der Schiffahrten,' bl. 298–319, een uitvoerig uittreksel van deze reis."

Not seen; title and note from Bosgoed, *op. cit.*, p. 243, no. 3512. [100.]

1671. Ray, J. An Account of the Dissection of a *Porpess*, promised Numb. 74; made, and communicated in a Letter of Sept. 12, 1671, by the Learned Mr. *John Ray*, having therein observ'd some things omitted by *Rondeletius*. <*Philos. Trans. Lond.*, vi, no. 74 [1671], p. 2220; no. 76 [1671], pp. 2274–2279. [101.]

1672. Anon. "A proportional view of the large Spermaceti whale run aground on Blyth Sand, and there killed himself. 30 Jan. 1672. [Pl. 8×14 inches.] Sold by W. Tringham."

Not seen; title from Bosgoed, *op. cit.*, p. 171, no. 2697. [102.]

1672. Josselyn, J. New-Englands | Rarities | Discovered: | In | Birds, Beasts, Fishes, Serpents, | and Plants of that Country. | Together with | The Physical and Chyrurgical Remedies | wherewith the Natives constantly use to | Cure their Distempers, Wounds, | and Sores. | Also | A perfect Description of an Indian Squa, | in all her Bravery; with a Poem not | improperly conferr'd upon her. | Lastly | A Chronological Table | of the most remarkable Passages in that | Country amongst the English. | — | Illustrated with Cuts. | — | By John Josselyn, Gent. | — | London, Printed for G. Widdowes at the | Green Dragon in St. Pauls Church yard, 1672. sm. 8° by sig., 24° size. ll. 2, pp. 1–114, cuts.

Reprinted in *Archæologia Americana* or *Trans. and Coll. Amer. Antiq. Soc.*, iv, pp. 133–238.

The Sperma Ceti Whale; What Sperma Ceti is; What Ambergreece is, pp. 35, 36. "Now you must understand this *Whale* feeds upon *Ambergreece*, as is apparent, finding it in the *Whales* Maw in great quantity, but altered and excrementitious: I conceive that *Ambergreece* is no other than a kind of Mushroom growing at the bottom of some Seas ..." (p. 36). [103.]

1672. Tulpius, N. Nicolai Tulpii | Amstelredamensis | Observationes Medicæ. | Editio Nova. | Libro quartior auctior, & Sparsim multis | in locis emendatior. | [Vignette.] Amstelredami, | Apud Danielem Elsevirium, | CIↃ IↃC LXXII. sm. 8°. ll. 7, pp. 1–392, pll. i–xviii.

Unicornu marinam, lib. iv, cap. lix, pp. 374–379, tab. xviii. The three very rude figures represent the animal in profile and the skull from above and below. They are the same as those given by Worm, by whom they were copied from Tulpius.

The *editio princeps* I have not seen; the dedication "Ad Petrum Tulpium filium" is dated 1641, which is probably the date of the first edition. There are numerous later editions, of which *editio quinta* is the only one I have seen (*q. v.*—1716. Tulpius, N.). [104.]

1673. Boyle, R. A Letter of the Honorable *Robert Boyle* of Sept. 13, 1673, to the Publisher, concerning *Amber Greece*, and its being a Vegetable Production. <*Philos. Trans. Lond.*, vii, no. 97, 1673, pp. 6113–6115.

Stated, on the authority of a factor of the Dutch East India Company, to issue from the root of a tree. [105.]

1675. Josselyn, J. An | Account | of two | Voyages | to New-England. | Wherein you have the setting out of a Ship, | With the charges; The prices of all necessaries for | furnishing a Planter & his Family at his first com- | ing; A Description of the Country, Natives and | Creatures; The Government of the Countrey as | it is now possessed by the English, &c. A large | Chronological Table of the most remarkable | passages from the first discovering of the Conti- | nent of America, to the year 1673. | — | By John Josselyn Gent. | — | The Second Addition. | — | [Quotation, 6 lines.] | London Printed for G. Widdowes at the Green Dragon in St. | Pauls Church-yard, 1675. sm. 8°. ll. 4, pp. 2–279+3.

1675. **Josselyn, J.**—Continued.

Orig. ed. 1664; the present is textually the same, except the title-page. Reprinted in the *Coll. Mass. Hist. Soc.*, 3d ser., iii, 1833, pp. 211–296, "and was again reprinted in 1865 by William Veazie, following the Harvard College copy" of the 1675 ed., from which copy the above collation is taken.

The Ambergreese-Whale, pp. 104, 105. "*Anno Dom.* 1668 the 17 of *July* there was one of them thrown up on the shore between *Winter-harbour* and *Cape-porpus* [near Boston], about eight mile from the place where I lived, that was five and fifty foot long" (p. 104). Nothing else of importance relating to *Cetacea*. [106.]

1675. **Martens, F.** Friderich Martens | vom Hamburg | Spitzbergische oder Groenlandische | Reise-Beschreibung | gethan im Jahr 1671. | Aus eigner Erfahrunge beschrieben, die dazu erforderte | Figuren nach dem Leben selbst abgerissen, (so hierbey in | Kupfer zu sehen) und jetzo durch den | Druck mitgetheilet. | [Vignette.] Hamburg, | Auff Gottfried Schultzens Kosten gedruckt, | Im Jahr 1675. sm. 4°. ll. 4, pp. 1–132, ll. 2, pll. A–Q = 16.

Cetacea, pp. 92–127. Meerschwein oder Tunin, pp. 92, 93. Butskopf, pp. 93, 94. Weisfische [=*Beluga catodon*], p. 94. Vom Einhorn [=*Monodon monoceros*], pp. 94, 95. Sågenfisch ins gemein genannt Schwerdtfisch [=*Orca*], pp. 95, 96. Vom Wallfisch, pp. 98–109, pll. A and Q (figs. *a*, *b*, *Balæna mysticetus*). Vom Wallfischfang, pp. 110–118. Wie sie mit den todten Walfisch ümbgehen, pp. 118–123. Von des Fetts, oder Trahns Brennerey, pp. 123–125. Von Finfisch [=*Balænoptera* sp.], pp. 125–127, pl. Q, fig. *c*.

Martens's work in relation to Cetology is one of great interest and importance, not only from its early date, but for the good account it gives of the Greenland Right Whale and the Whale-fishery, and also especially for its very good figures of the Greenland Whale and of the Finfish. They may be fairly considered as the first passable figures of these species, and those of the first were the standard figures down to the time of Scoresby (1820), and as such were many times copied. His references to the other northern Cetacea are intelligent, and of great historic interest. The only separate translations of the work I have seen cited are an Italian (Venice, 1680, 12°) and a Dutch (Amsterdam, 1710, 4°, *q. v.*), but various versions, generally more or less abridged, have appeared in collections of voyages, etc., as Vries's (Amsterdam, 1685), Narborough's (London, 1694), Harris's (London, 1705), Bernard's (French, Amsterdam, 1731), Adelung's (German, Halle, 1768), etc. Also, White's (1855, Hakluyt Soc.), *q. v.* [107.]

1676. **Debes, L. J.** Færoœ, & Fœroa Reserata: | That is | A Description | of the | Islands & Inhabitants | of | Fœrœ: | Being | Seventeen Islands subject to the | King of Denmark, lying under 62 | deg. 10 min. of North Latitude. | Wherein several Secrets of Nature | are brought to Light, and some Anti- | quities hitherto kept in darkness | discovered. | Written in Danish by Lucas Jacobson | Debes, M. A. and Provost of the | Churches there. | — | Englished By J[ohn]. S[terpin]. Doctor of Physick. | — | Illustrated with Maps. | — | Printed by F. L. for William Iles, at the Flow- | er-de-Luce in Little Brittain, over against | St. Bartholomews Gate. 1676. 12°. ll. 12, pp. 1–408. [The copy examined (Harv. Coll. Libr.) lacks the maps.]

Chap. iii. Of the Waters Fertility, pp. 163–189.—Grind-Whales [= *Globiocephalus melas*], pp. 171–179. Doglings [=*Hyperordon* sp.], pp. 179–184. Roar and Witch-Whale, pp. 184–188.

The chapter "Of the Waters Fertility" is full of quaint and curious information about the myths and superstitions prevalent among the Foero islanders in the 17th century respecting the marine mammalia found about these islands, as well as replete with interesting matter relating to the natural history of the Seals and Cetaceans. The account of the Grind-Whale (*Globiocephalus melas*) is especially important.

"The Fishes wherewith this people maintain themselves are of three sorts; first, small Fishes, secondly Seals, and in the third place Whales" (p. 164).

The date of the original Danish edition I am unable to give. A German version (8°, Kopenhagen und Leipzig) was published in 1757, *q. v.* [108.]

1676. "**Sachs, Paul Ludw.** Monocerologia seu de genuinis Unicornibus. Dissert. Raceburgi, 1676. 8°. pp. 182, pl. 1."

Not seen; title from Carus and Engelmann. [109.]

1677. **Anon.** "Strange news from the deep, being a full account of a large prodigious whale lately taken in the river Wioner, within six miles from ? Colchester. (z. pl.) 1677. 4°."

Not seen; title from Bosgoed, *op. cit.*, p. 171, no. 2695. [110.]

1677. CHARLTON, W. Gualteri Charltoni | Exercitationes | de | Differentiis & Nominibus Animalium. | Quibus accedunt | Mantissa Anatomica, | Et quædam | De variis Fossilium generibus, | Deque differentiis & nominibus Colorum. | Editio secunda, duplo fere auctior priori, novisque iconibus ornata. | [Vignette.] Oxoniæ, | E Theatro Sheldoniano, An. Dom. 1677. 4°. ll. 10. Animalia Quadrupeda, Serpentia, Insecta, Aves, pp. 1–119; Pisces, etc., pp. 1–106; Fossilia, etc., l. 1, pp. 1–78, ll. 10, Indices. (With figures in the text.)

Piscium Cetaceorum Classis [pars ii], pp. 46–50. I. *Balæna*. 1. *Balæna vulgaris*, the common Whale, p. 46; 2. *Physeter*, & *Physatus*, the puffing aut spouting Whale, p. 47; 3. *Cetus Dentatus*, à Carolo Clusio, the Sperma-Ceti Whale, p. 47; 4. *Pustes*, the Swift Whale, p. 47; 5. *Orca*, the Ork, p. 47; 6. *Monoceros*, Unicornu Marinum, the Unicorn Whale, p. 47. II. *Pristis*, p. 47. III. *Delphinus*, the Dolphin aut Grampus, p. 47. IV. *Phocæna*, the Porpus aut Porpes, p. 48. V. *Scolopendra Cetacea*, p. 48. VI. *Phoca*, p. 48. VII. Walrus, aliis Mors, p. 49. VIII. *Manati*, p. 49. IX. *Hippopotamus*, p. 50. The *Editio princeps*, 1672, I have not seen. [111.]

1678. "BARTHOLINUS, TH. De Unicornu observationes novae, secunda editione auctiores et emendatiores, editae à filio *Casp. Bartholino*. Amstelodami, Wetstenius, 1678. kl. 12°. Met 2 platen en afbeeldingen in den tekst."

Not seen; from Bosgoed, *op. cit.*, p. 157, no. 2478. [112.]

1678. CAPEL, RUDOLFF. Norden, | Oder | Zu Wasser und Lande im Eise | und Snee, mit Verlust Blutes und Gutes | zu Wege gebrachte, und fleisig | beschriebene | Erfahrung und Vorstellung | des Norden, | Auss | Denen, welche | zu unterschiede- | nen Zeiten gelebet, viel im Norden versu- | chet, viel auch umbsonst angefangen und ange- | wandthaben: | Auff guter Freunde Begehren zusammen gebracht | dargereichet, und ferner zu betrachten und | zuvermehren, | von | Rudolff Capel, der H. Schrifft D. | und Historiarum P. P. | aussgefärtiget. | — | Hamburg, | Bey Johann Nanmann. | und Stockholm | Bey Gottfried Liebezeit, Im 1678sten Jahre der Christer. 4°. ll. 4, pp. 1–236, ll. 12.

Das 5 Capittel. Georg Niclaus Schurtzen bericht, von der Natur und Eigenschaft, auch Nachstellung und Fang des Walfisches, im Jahr nach C. G. 1672. aussgefertigtet, pp. 197–212. There are also references to Whales at pp. 55 and 67. Chapter v gives a quite detailed account of the external characters, habits, products, and capture of the Greenland Right Whale. The female is said to be the larger, etc. There are also other passing allusions to Whalefishing (Walfischfangst), as at pp. 141, 158, 159, etc. There is also a large plate (13½ × 11 inches), bound (in the copy examined) to face p. 156, which is a faithful reproduction of Martens's plate of the common *Balæna mysticetus* (two figures), and a Finner Whale, with the accessories of whale-louse, harpoon, and lance. [113.]

1678. "EXQUEMELIN, ALEXANDRE OLIVIER. De | Americaensche | Zee Roovers. | Behelsende een pertinente en waerachtige Beschrijving van alle de | voornaemste Roveryen, en onmenschlijcke wreedheden, | die de Engelse en Franse Rovers, tegens de Spanjaerden | in America, gepleeght hebben. | Verdeelt in drie deelen: | Het Eerste Deel verhandelt hoe de Fransen op Hispanjola gekomen zijn, de | aerdt van 't Landt, Inwoonders, en hun manier van leven aldaer. | Het Tweede Deel, de opkomst van de Rovers, hun regel en leven onder mal- | kander, nevens verscheyde Roveryen aen de Spanjaerden gepleeght. Het Derde 't verbranden van der Stadt Panama, door d' Engelsche en Franse | Rovers gedaen, nevens het geen de Schrijver op sijn Reys voorgevallen is. | Hier achter is bygevoeght, | Een korte verhandeling van de Macht en Rijkdommen die de Koninck van | Spanje, Karel de Tweede, in America heeft, nevens des selfs | Inkomsten en Regering aldaer. | Als mede een kort begrijp van alle de voornaemste Plaetsen in het selve Gewest, | onder Christen Potentaten behoorende. | Beschreven door A. O. Exquemelin. | Die self alle dese Roveryen, door noodt, bygewoont heeft. | Met schoone Figuren, Kaerten, en Conterfeytsels, alle na 't leven geteeckent, versien. | t' Amsterdam By Jan ten Hoorn, Boeckverkoper, over 't Oude | Heeren Logement.

1678. "EXQUEMELIN, ALEXANDRE OLIVIER.—Continued.
Anno 1678. | 4°. 2 titles, 1 of which is engraved, 2 l., pp. 186, 4 portraits, 6 copper-plates, and 2 maps."

"First edition, of extreme rarity. Perhaps no book in any language was ever the parent of so many imitations, and the source of so many fictions, as this, the original of the buccaneers of America. . . . 'There is certainly no other book of that time which experienced a popularity similar to that of the "Buccaniers of America," which was, in the ten years following its publication, translated into most of the European languages; and there is a fact most curious in the literary history of all times, that the original was certainly unknown to all translators but one. They were all inclined to take the Spanish edition for the original; nay, even the learned editors of Mr. Grenville's catalogue seem doubtful whether the Dutch edition existed in print, or in MS. only.'"

Not seen; title and comment from Sabin, *Bibl. Amer.*, vi, pp. 309, 310, no. 23468. There is a later "very much altered" Dutch edition, 4°, Amsterdam, 1700; a German, 12°, Nürnberg, 1679; a Spanish, 4°, 1681, "translated from the [first] Dutch"; also, later Spanish editions. The first French edition, "of extreme rarity," was published in 2 vols., 12°, Paris, 1686, "a translation from the English"; a second French, by the same publishers, in 1688; the collation of two later French editions (1744 and 1774, *q. v.*) is given *infrà*. Three English versions (one said to be an abridgment), translated from the Spanish, appeared in 1684 (*q. v.*), with several later editions, and possibly other translations into English. (See Sabin, *Bibl. Amer.*, vi, pp. 309–318, 828, nos. 23468–23494.)

I have examined the following editions, the collation of which is given by Sabin (*op. cit.*): 4°, Spanish (translated from the English), 1631 (no. 23471 of Sabin), in which the account of the "Manentines" occurs at pp. 294, 295 (1½ pp. general account of external characters, quality of flesh, habits, and mode of capture, with no figure); 12°, Spanish, "Impression Segunda," 1682 (no. 23473 of Sabin); account of the "Manentines" at pp. 438–440, and the same as that of the 4° edition of 1681; no figure. Dutch, 4°, 1700 (no. 23469 of Sabin); account of the "Zee-Koe" at pp. 131, 132 of Deel 1, substantially the same as the Spanish; no figure. English, "The Third Edition," 1704 (no. 23485 of Sabin); account of the "Sea-Cows" at pp. 160–162 (8 lines less than one page in length, and substantially the same as the Spanish). English, "The Fifth Edition," 1771 (no. 23490 of Sabin); account of the "Manentine," or "Sea-Cow," at pp. 209, 210, of vol. i. In none of the editions above cited is there any figure of the animal. French, 12°, 1744 (*q. v.*), and 1774 (*q. v.*). The accounts of the Manatee in these two French editions is entirely different from that of the Spanish, Dutch, and English editions just cited; besides being twice as long, and containing much new matter, there is an (apparently) original figure. [114.]

1678. MAJOR, JOHANN DANIEL. De Respiratione Phocænæ vel Tursionis. <*Ephem. Med.-phys. Germ Acad. Nat. Curios.*, 1677 (1678), pp. 4, 5. [115.]

1678. PAULLINUS, CHRISTIANUS FRANCISCUS. De Singulari Monstro Marino. <*Ephem. Med.-phys. Germ. Acad. Nat. Curios.*, 1677 (1678), pp. 79, 80. [116.]

1678. "SCHOLTZ, ADAM SIGISM. Cerebrum Orcae vulgari supposita Spermatis Ceti larva develatum. Lipsiae, 1678. 4°. ll. 12."

Not seen; title from Carus and Engelmann. [117.]

1680. LYSER, POLYC. Disputatio physico-philologica de Cetis. Lipsiae, 1680. 4°. pp. 20.

Not seen; title at second-hand. [118.]

1681. BLASIUS, G. Gerardi Blasii | Amstelrædamensis, | Medic. Doct. & Prof. Ordin. | Anatome | Animalium, | Terrestrium variorum, Volatilium, Aquatilium, | Serpentum, Insectorum, Ovorumque, | structuram naturalem | Ex Veterum, Recentiorum, propriisque Observationibus | proponens, | Figuris variis illustrata. | [Vignette.] Amstelodami, | Sumptibus Viduæ Joannis à Someren, | Henrici & Viduæ Theodori Boom. | — | cIɔ Iɔc L xxxi. 4°. ll. 3, pp. 1–494, pll. i–lx.

Cap. xvi. De Phocena s. Delphino septentrionalium, pp. 286–290, pl. li (animal, skull, lower jaw, scapula, pectoral limb, ear bones, tail, etc. = 8 figg).

Cap. xxxv. De Tursione, pp. 306, 307. [119.]

1681. GREW, N. Musæum Regalis Societatis. | Or a | Catalogue & Description | Of the Natural and Artificial | Rarities | Belonging to the | Royal Society | And preserved at | Gresham Colledge. | Made | By Nehemjah Grew, M. D. Fellow of the Royal Society, | and of the Colledge of Physitians. | — | Whereunto is Subjoyned the | Comparative Anatomy | of | Stomachs and Guts. | — | By the

1681. **Grew, N.**—Continued.
same Avthor. | — | London, | Printed by W. Rawlins, for the Author, 1681. 4°. ll. 7, pp. 1–386, l. 1+ll. 2, pp. 1–42, pll. i–xxxi.

Of Viviperous Fishes, sect. i, chap. i, pp. 81–103. Includes *Cetacea*, *Sirenia*, and *Pinnepedia* as well as true Fishes. Descriptions are given of ear bones and vertebræ of Whales. Narwhal tusks, head and tail of Dolphin, skeleton of "Porpess or Sea-Hog," etc. [120.]

1681. **Major, Johann Thomas.** De Anatome Phocænæ, vel Delphini septentrionalis. <*Ephem. Med.-phys. Germ. Acad. Nat. Curios.*, 1672 (1681), pp. 22–32, figs. i, iii–ix.

Fig. i, Tursio integer, vel Phocæna; fig. iii, Os sterni Phocænæ; fig. iv, Scapula sinistri; fig. v, Pinna anterior sinistri, Manum exhibens; figg. vi, vii, Os petrosum sub meatu auditorio; fig. viii, Cranium Tursionis; fig. ix, Maxilla inferioris pars dextra. [121.]

1681. "**Tyson, Edward.** Phocæna: Or the Anatomy of the *Porpus*, dissected at Gresham College: With a Preliminary Discourse concerning Anatomy, and a Natural History of Animals. By Edward Tyson, M. D., London, 1681."

Not seen; title at second hand. [122.]

1682. **Segnette, —.** Historia Ceti aut Balænæ ad littora Rupellæ propulsæ. <*Zodiacus medico-gallicus*, annus secundus, authore Nicolao de Blegny. Genevæ, 1682, i, pp. 63–67.

Not seen; cited by P. Fisher (*Ann. sci. nat.*, 5^e sér., xv, 1871, art. no. 3, pp. 8, 9), as giving a description (measurements, external characters, and parasites) of a Whale stranded Feb., 1680, near the island of Ré. [123.]

1683. "**Achrelius, L.** Cetographia, sive dissertatio historico-physica de cetis. Aboae, 1683. Met 6 houtgravuren. 8°."

Not seen; title from Bosgoed, *op. cit.*, p. 157, no. 2469. [124.]

1684. "[**Oelen, J. A. van**]. De seldsaame en noit gehoorde Walvischvangst, voorgevallen bij St. Anna-Land, in 't jaar 1682, den 7 October, mitsgaders eene pertinente beschryvinge van de geheele Groenlandse vaart, verhandeld in prose en versen. Nevens verscheide saaken tot die materie dienende, door P. P. van S., met schoone kopere prentverbeeldinge (van Luyken) versierd; dese 2e druk merkelijk verbeterd en bijna de helft vermeerderd. Tot Leyden in 't jaar 1684. 4°. (Zonder naam van uitgever.)"

"Die vermeerdering bestaat o. a. uit het volgende: Ao 1677. Ordre, beraamt bij de Gecomm. van de Groenlandse visserij, over 't bergen der goederen, enz. Contract tusschen de Commandeur en zijn volk na Groenland. Een beschrijving van het scheepsleven en het berijmd 'verhaal' enz.

"De 1e druk verscheen in 1683 onder den titel: Kort en opregt verhaal van het droevig en avontuurlijk wedervaren van Abr. Jansz. Oelen. Zie voor de beschrijving der walvischvangst op rijm: *Fr. Martens*, Beschrijv. van Groenland. . . . en *Zorgdrager's* Groenlandsche visscherij."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 243, no. 3523. [125.]

1684. **Sibbald, Robert.** Scotia Illustrata | sive | Prodromus | Historiæ Naturalis | in quo | Regionis natura, Incolarum Ingenia & Mores, Morbi iisque medendi Methodus, & | Medicina Indigena accuratè explicantur: | et | Multiplices Naturæ Partuis in triplice ejus Regno, Vegetabili scilicet, Animali & Minerali | per hancce Borealem Magnae Britaniæ Partem quæ Antiquissimum Scotiæ | Regnum constituit, undiquaque diffusi nunc primum in Lucem eruuntur, & | varii eorum Usus, Medici præsertim & Mechanici, quos ad Vitæ | cum necessitatem, tum commoditatem præstant, cunctis | perspicuè exponuntur: | — | Cum Figuris Æneis. | Opus viginti Annorum | Serenissimi Domini Regis Caroli. II. Magnæ Britanniæ, &c.—Monarchæ Jussu editum. | — | Auctore Roberto Sibbaldo M. D. Equite Aurato, Medico & Geographo | Regio, & Regii Medicorum Collegii apud Edinbvrgvm Socio. | — | [Vignette.] | — | Edinbvrgi, | Ex officinâ Typographicâ Jacobi Kniblo, Josuæ Solingensis & Johannis Colmarii, Sumptibus Auctoris. | — | Anno Domini M.DC.LXXXIV. 2°. ll. 2, pp. 1–102, ll. 3.

Pars Secunda | Specialis. | Tomus Primus | de Plantis Scotiæ | tam

1684. SIBBALD, ROBERT—Continued.
nis | quam hortensibus | — | Qvæ in Libro Primo et Secundo | tractantvr. | — | [Vignette.] | — | . . . [Imprint as above.] ll. 3, pp. 1-114, ll. 3.

Pars Secunda | Specialis. | Tomus Secundus | de Animalibus Scotiæ | tam feris quam domesticis | et de | Mineralibus Metallis | et | Marinis Scotiæ. | — | De Qvibvs in Libro tertio et quarto agitur. | — | [Vignette, and imprint as above.] ll. 3, pp. 1-56, ll. 4, pll. i-xxii.

Sectio Quarta. De Piscibus. Caput ii (pp. 22, 23, 16 lines). *Balæna*, the Common Whale; *Physeter*, the Spouting Whale; *Cetus dentatus Clusii*, in cujus capite Sperma Ceti reperitur; Porcus Marinus Harengos persequitur, & Delphinus esse creditur; *Phocæna*, the Porpus or Porpoise, Delphini species. [126.]

1685. MARTINIÈRE, P. M. DE LA, *en* MARTENS, F. "De Noordsche Weerweld, vertoond in twee nieuwe aenmercklycke Reysen, d' eene van de heer *Martinière* ... d' andere van *F. Martens*. Vertaeld en doorgaens met toedoeningen verrijkt door *S. de Vries*. Amsteldam, A. D. Ooszaen, 1685. 4°. Met platen."

Not seen; title from Bosgoed, *op cit.*, p. 252, no. 3604. *See* 1671. MARTINÈRE, P. M. DE LA, *and* 1675. MARTENS, F., of which the present appears to be a Dutch translation. [127.]

1686. WILLOUGHBY, FRANCIS. Francisci Willughbeii Armig. | De | Historia Piscium | Libri Quatuor, | Jussu & Sumptibus Societatis Regiæ | Londinensis editi. | In quibus non tantum De Piscibus in genere agitur, Sed & species omnes, tum ab a- | liis traditæ, tum novæ & nondum editæ bene multæ, naturæ ductum servante | Methodo dispositæ, accurate describuntur. | Earumque effigies, quotquot haberi potuere, vel ad vivum delineatæ, vel ad | optima exemplaria impressa; Artifici manu elegantissime in æs incisæ, ad de- | scriptiones illustrandas exhibentur. Cum Appendice Historias & Observationes | in supplementum Operis collatis complectente. | Totum Opus | Recognovit, Coaptavit, Supplevit, | Librum etiam primum & secundum integros adjecit | Johannes Raius e Socitate Regia. | [Vignette.] Oxonii, | E Theatro Sheldoniano, Anno Dom. 1686. 2°. ll. 4, pp. 1-343, 1-30 (Appendix), ll. 7, pll. 186+ —

Liber Secundus De Piscibus Cetaceis seu Belluis Marinis, pp. 26-43.—Caput primum. De Cetis vel cetaceis Piscibus in genere, ex scriptis Rondeletii & Gesneri præcipue, pp. 26, 27. Cap. ii. De Delphino: e Rondeletii, Gesneri, & aliorum scriptis, pp. 28-31. Cap. iii. Phocæna Rondeletii, Gesn. . . . Phocæna seu Tursio Bellonii & Scaligeri. Cimbris Marsuin vel Porcus marinus: Angl. A Porpesse, pp. 31-35. Cap. iv. Balæna Rondeletii, Gesneri & aliorum. The Whale, pp. 35-38. Cap. v. Balæna vera Rondeletii, Gesn. . . . pp. 38-40. Cap. vi. Orca Rondeletii, & Bellonii, p. 40. Cap. vii. Physeter Rondeletii, Gesn. . . . A Whirl-Pool, p. 41. Cap. viii. Cete Clusio Exot., lib. 6. Descriptum Pot-Wallfisch Batavis maris accolis dictum, pp. 41, 42. Cap. ix. De Monocerote pisce, qui de genere Cetaceo esse fertur, pp. 42, 43. De Pisce Monocerote, seu Unicornu, App., pp. 12, 13 (ex Tulpio).

The plates have an engraved special title-page, dated 1685—one year earlier than the text—and are sometimes cited as a separate work. The following is a transcription of the title:

Francises Willoughby | Icthyographia | ad Amplissimum Virum | D.^{num} Samuelem Pepys, | Præsidem Soc. Reg. Londinensis, | Concilium, | et | Socios ejusdum. | Figuræ Novæ, quæ non paucæ sunt † notantur. | Sumptibus | Societatis Regalis | Londinensis | 1685.

Pl. A. 1. Pisces Cetacei. Fig. 1. Delphinus; Fig. 2. Phocæna (fig. orig.); Fig. 3. Physeter (fig. ex Clusio). Pl. A. 2. Piscis Monoceros ejusq. cornu a varijs authoribus exhibitum; item embryonis alicujus cornu. 7 figg.—animal, skull, horns; one fig. of horn orig. [128.]

1687. "BRUNSMANN, —. Diss. de Ceto Ionae, qua eum verum fuisse Cetum ostenditur. Jen., 1687. 8°."

Not seen; title from Donndorff, *Zool. Beytr.*, i, 1792, p. 776. [129.]

1688. BARTHOLINUS, TH. Thomæ Bartholini | de | Unicornu | observationes novæ. | Secunda editione Auctiores & | emendatiores editæ à Filio | Casparo Bartholino. | [Vignette.] Amstelædami | Apud Henr. Wetstenium, | — | CIↃ ICC LXXVIII. 12°. ll. 8, pp. 1-381, numerous cuts.

De Unicornu Groenlandico, pp. 108-125 (p. 121, 3 views of the skull of the Narwhal, and one of the detached horn). [130.]

1689. "Baring, —. De Ceto Ionae. Brem., 1689."

Not seen; title from Donndorff, *Zool. Beytr.*, i, 1792, p. 776. [131.]

1690. Cleyerus, Andreas. De Ceto minore Ambrophago. <*Ephem. Med.-phys. Germ. Acad. Nat. Curios.*, 1689 (1690), p. 69, fig. 4.

The upper figure represents a fabulous monster nearly in profile, somewhat whale-like in general form, but having two upward-curving, slender, pointed tusks in the end of the upper jaw and two high bosses or humps on the front of the head. The lower figure shows the creature partly on the side; the dorsal fin, humps, and tusks are not shown, and the figure has a much more whale-like aspect. [132.]

1690. Faber, J. M. Addenda ad A. Cleyeri Observationes de ceto minore Ambrophago. <*Ephem. Med.-phys. Germ. Acad. Nat. Curios.*, 1689 (1690), p. 456.

See above, 1690. Cleyer, A. [133.]

1692. "Pfeifer, —. Diss. piscem Ionae deglutitorem fuisse Balaenam. Lub., 1692. 4°."

Not seen; title from Donndorff, *Zool. Beytr.*, i, 1792, p. 776. [134.]

1693. Anon. An Account of a Book Intituled, *Phalænologia Nova sive Observationes de Rarioribus quibusdam* Balænis *in* Scotiæ *Littus nuper* ejectis, &c. Aut Roberto Sibbald, Edinburgi *in* Quarto, 1692. <*Philos. Trans. Lond.*, xvii, no. 205 [1693], pp. 972–976.

Review of the work. [135.]

1693. Clayton, J. A Continuation of Mr. *John Clayton's* Account of *Virginia*. <*Philos. Trans. Lond.*, xvii, no. 205 [1693], pp. 941–948.

Contains a notice of the discovery of Whale remains near Jamestown, Va. [136.]

1694. "Drossander, A. Dissertatio de Balaena. Upsaliae, 1694. 4°. Met eene plaat." [pp. 62.]

Not seen; title from Bosgoed, *op. cit.*, p. 161, no. 2543. [137.]

1694. "Pechlin, —. De pisce Ionae deglutitore, non fuisse Balaenam. Lub., 1694. 8°."

Not seen; title from Donndorff, *Zool. Beytr.*, i, 1792, p. 776. [138.]

1696. "Smallegange, M. Nieuwe Cronyk van Zeeland. Eerste (éénig) deel. Vervattende de voor dezen uitgegeven cronyken van de Heeren Jacobus Eyndius en Johan Reygersberg, veel vermeerdert omtrent deres landschaps oudheden en herkomsten, wateren en stroomen, eylanden, steden en heerlijkheden. Met vele kopere platen (en kaarten) verciert. Tot Middelburg. By J. Meertens, 1696. fol."

"Walvisvangst, pp. 173–178; van de visschen in onse stroomen en eerst van de zeehonden, zeekatten, bruinvisschen, pp. 178–181."

Not seen; title and references from Bosgoed, *op. cit.*, p. 210, no. 3169. [139.]

1697. Lister, M. Of a Venomous Scratch with the Tooth of a Porpos, its Symptoms and Cure. <*Philos. Trans. Lond.*, xix, no. 233 [1697], p. 726. [140.]

1697. Molyneux, T. A discourse concerning the *Large Horns* frequently found under Ground in *Ireland*, Concluding from them that the great *American Deer*, call'd a *Moose*, was formerly common to that Island: With Remarks on some other things Natural to that Country. <*Philos. Trans. Lond.*, xix, no. 227 [1697], pp. 489–512, 3 figs.

Contains remarks upon the nature of ambergris, spermaceti, and on the occurrence of Sperm Whales on the coast of Ireland. [141.]

1697. Tredwey, R. Part of a Letter of Mr. *Robert Tredwey*, to Dr. *Leonard Plukenet*, Dated *Jamaica*, Feb. 12, $169^{6}/_{7}$, giving an Account of a great piece of Ambergriese thrown on that Island; with the Opinion of some there about the way of its Production. <*Philos. Trans. Lond.*, xix, no. 232 [1697], pp. 711, 712.

Said to be produced by some unknown sea "Creature," which is believed "to swarm as Bees, on the Sea-Shore, or in the Sea." [142.]

1698. ACUÑA, CRISTOVAL D', ACARETE, GRILLET, *and* BECHAMEL. Voyages | and | Discoveries | in | South-America. | The First up the River of Amazons to | Quito in Peru, and back again to Brazil, | perform'd at the Command of the King | of Spain. | By Christopher d'Acvgna. | The Second up the River of Plata, and | thence by Land to the Mines of Potosi. | By Mons. Acarete [du Biscay]. | The Third from Cayenne into Guiana, in search | of the Lake of Parima, reputed the richest | Place in the World. | By M. [Jean] Grillet and [Francis] Bechamel. | — | Done into English from the Originals, being the on- | ly Accounts of those Parts hitherto extant. | — | The whole illustrated with Notes and Maps. | — | London, | Printed for S. Buckley at the Dolphin over against | St. Dunstan's Church in Fleetstreet. 1698. 8°. pp. i–viii; [Pt. i], pp. 1–190, map; [Pt. ii], l. 1, pp. 1–79, map; [Pt. iii], ll. 2, pp. 1–68.

Parts ii and iii have each a full title-page, and each part is separately paged.

[Pt. i.] A Relation of the Great River | of Amazons in South-America. | Containing all the Particulars of | Father Christopher d'Acugna's Voy- | age, made at the Command of the | King of Spain. | Taken from the Spanish Original of the | said Chr. d'Acugna, Jesuit. [Half-title.]

Chap. xxv. The great Plenty of Fish in this River, and which is the best sort of them, pp. 61, 62. Consists almost exclusively of an account of the "*Pege Buey*" [*Manatus americanus*], describing its appearance, how it is taken by the Indians, and extolling its flesh as an article of food. A note at the end refers to the trade in its flesh with the "*Antilles* or *Antego*-Islands," to which it is extensively exported.

The original of this "Relation" (see *op. cit.*, Introd., pp. iv, v) is said to have been published at Madrid in 1641 (4°) with the title "Nuevo descumbrimiento del gran Rio de las Amazonas," but immediately suppressed by Philip IV., so that copies of it quickly became exceedingly scarce.

[Pt. iii.] A | Journal | of the | Travels | of | John Grillet, | and Francis Bechamel | into | Gviana, | In the Year, 1674. | In | Order to Discover the Great Lake | of Parima and the many Cities | said to be situated on its Banks, and | reputed the Richest in the World. | — | London: | Printed for Samuel Buckley, 1698.

A "kind of Fish, which they catch in the Rivers with a sort of Harping Iron" is alluded to at p. 63 as being the basis of a profitable trade to the Antego Islands. It is evidently the Manatee. [143.]

1699. "DOOREGEEST, E. A. VAN, *en* C. A. POSJAGER. Den Rijper Zee-postil, bestaande in xxii predicatiën, toegepast op den Zeevaert. Tot onderwijzinge vermaninge en vertroostinge in de ware godsaligheyt voor allerlei Zeevarendo lieden, dog voornamentlijk voor diegene, welke op den Haring en Walvischvangst uitgaen. Mitsgaders nog en korte beschryvinghe aengaende de opkomst van Holland, waer in 't bezonder ook gehandelt word van 't Eyland met zijn dorpen, dog voornamentlijck rakende de eerste oorspronck en ware gelegenheyt der Haring en Walvischvangst. 't Amsterdam, bij Jac. van Nieuweveen, 1699. gr. 8°."

"Zie aldaar: bl. 343–360."

Not seen; title and reference from Bosgoed, *op. cit.*, p. 235, no. 3446. [144.]

1700. ANON. Description de la piece d'ambregris que la chambre d'Amsterdam a recue des Indes orientales pesant 182 livres; avec un petit traite de son origine & de sa vertu par Nicolas Chevalier a Amsterdam chez l'auteur. 1700. in 4°. p. 67. <*Philos. Trans. Lond.*, xxii, no. 263 [1700], pp. 573, 574.

Review of the work. See next title. [145.]

1700. "CHEVALIER, NICOL. Description de la piece d'Ambre gris que la chambre d'Amsterdam a reçue des Indes orientales pesant 182 livres. Avec un petit traité de son origine et de sa vertu. (Mit 5 Kpfrtaf. u. Abdruk einer Schaumünze.) in-4. Amsterdam 1700, chez l'auteur."

Not seen; title from Carus and Engelmann. [146.]

1702. "ENGELBRECHT, —. Diss. duae de pisce, Ionae deglutitore. Lips., 1702. 8°."

Not seen; title from Donndorff, *Zool. Beytr.*, i, 1792, p. 776. [147.]

1702. Reisel, Sam. "De Unicornu marino duplici. <*Ephem. Acad. Nat. Cur.*, Dec. 3, An. 7 et 8. 1699–1700 (1702), pp. 350–352."

Not seen; title from Carus and Engelmann. [148.]

1702. "Soeteboom, H. Oudheden van Zaanland, Stavoren, Vronen en Waterland. Amsterdam, 1702. 2 dln. 12°."

"Waarin ook over de visscherij (haring- en walvischvangst der verschillende Zaanlandsche dorpen) gehandeld wordt."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 253, no. 3611. [149.]

1703. Anon. A | Collection | of | Voyages | Undertaken by the | Dutch East-India Company, | for the Improvement of | Trade and Navigation. | Containing | An Account of several Attempts to find out the | North-East Passage, and the Discoveries in | the East-Indies, and the South Seas. | Together | With an Historical Introduction, giving an ac- | count of the Rise, Establishment and Pro- | gress of that great Body. | — | Translated into English, and Illustrated with se- | veral Charts. | — | London, | Printed for W. Freeman near Temple Bar, J. Walthoe in the | Temple . . . [= 3 lines of names of booksellers]. 1703. 8°. ll. 16, pp. 1–336.

The name of the translator is not given, neither are those of the authors whose works are here translated.

In the history of "Third Voyage of the Dutch to find the Passage to China" (pp. 16–68) occurs, at pp. 21, 22, an account of the "Beasts" of Spitzbergen, among which are included the Whales. About half a page relates to the Greenland Right Whale, giving a quaint description of its appearance and food. [150.]

1703–05. Dampier, W. A | New Voyage | round the | World. | Describing particularly, | The Isthmus of America, several Coasts | and Islands in the West Indies, the Isles | of Cape Verde, the Passage by Terra del Fue- | go, the South Sea Coasts of Chili, Peru, and | Mexico; the Isle of Guam one of the La- | drones, Mindanao, and other Philippine | and East India Islands near Cambodia, China, | Formosa, Luconia, Celebes, &c. New Hol- | land, Sumatra, Nicobar Isles; the Cape of | Good Hope, and Santa Hellena. | Their | Soil, Rivers, Harbours, Plants, Fruits, Ani- | mals, and Inhabitants. | Their | Customs, Religion, Government, Trade, &c. | — | Vol. I. | — | By Captain William Dampier. | — | Illustrated with Particular Maps and Draughts. | — | The Fifth Edition Corrected. | — | London: | Printed for James Knapton, at the Crown in St. | Paul's Church-yard, 1703. 8°. ll. 5, pp. i–vi, 1–550, 5 maps, and several small woodcuts in text.

[1705.] Voyages and Descriptions | Vol. II. | In Three Parts, viz. | 1. A Supplement of the Voyage round the World, | describing the Countries of Tonquin, Achin, | Malacca, &c. their Products, Inhabitants, | Manners, Trade, Policy, &c. | 2. Two Voyages to Campeachy; with a De- | scription of the Coasts, Products, Inhabi- | tants, Logwood-Cutting, Trade, &c. of | Jucatan, Campeachy, New Spaine, &c. | 3. A Discourse of Trade-Winds, Breezes, | Storms, Seasons of the Year, Tides and | Currents of the Torrid Zone throughout | the World: With an Account of Natal in | Africk, its Products, Negro's, &c. | — | By Capt. William Dampier. | — | Illustrated with Particular Maps and Draughts. | — | To which is added, | A General Index to both Volumes. | — | The Third Edition. | — | London, | Printed for James Knapton, at the Crown in | St. Paul's Church-yard. MDCCV. 8°, in three separately paged parts, as follows: ll. 4 (title, 1 l.; dedication, 1 l.; preface, 1½ ll.; contents, ½ l.). Pt. i, pp. 1–184, map; Pt. ii, pp. 1–132, map; Pt. iii, l. 1, pp. 1–112, 2 maps. General Index, ll. 36; publisher's Catalogue of books, ll. 2.

[1703.] A | Voyage | to | New Holland, &c. | In the year, 1699. | Wherein are described | The Canary Islands, the Isles of Mayo and | St. Jago. The Bay of All Saints, with the | Forts and Town of Bahia in Brazil. Cape | Salvadore. The Winds on the Brazilian | Coast. Abrolho-Shoals. A Table of all

1703–05. Dampier, W.—Continued.
the | Variations observ'd in this Voyage. Oc- | currences near the Cape of Good Hope. | The Course to New Holland. Shark's Bay. | The Isles and Coast, &c. of New Holland. | Their Inhabitants, Manners, Customs, Trade, &c. | Their Harbours, Soil, Beasts, Birds, Fish, &c. | Trees, Plants, Fruits, &c. | Illustrated with several Maps and Draughts; also | divers Birds, Fishes, and Plants, not found in | this part of the World, Curiously Ingraven on | Copper-Plates. | — | Vol. III. | — | By Captain William Dampier. | — | London: | Printed for James Knapton, at the Crown in St. Paul's | Church-yard. 1703. 8°. ll. 12 (title, 1 l.; dedication, 2 ll.; preface, 6 ll.; contents, 3 ll.), pp. 1–162; index, 4½ ll.; publisher's cat. of books, 2½ ll., 4 topographical pll., 2 pll. of birds, 5 pll. plants, 3 pll. fishes.

Captain Dampier's "Voyages" thus form three volumes, the second of which also consists of three parts, each separately paged, and with a general index to the first two volumes. In the set I have here collated, vols. ii and iii are bound together. Vol. i belongs to the "fifth edition," vol. ii to the "third," and vol. iii to the first; the date of vols. i and iii is 1703; that of vol. ii, 1705. The date of the first edition of vol. i is said to be . I have references to a 1702 ed. which correspond exactly with the 1703 ed. here collated.

As is well known, Dampier was an acute natural-history observer as well as a bold navigator and adventurer, and his observations on the Beasts, Birds, and Fishes he met with during his long voyages are among the best and most trustworthy of his time. His work is of importance in the present connection for his very full account of the Manatee, which he met with at numerous and widely distant points. There are also notices of Whales.

Manatee, or Sea-cow, vol. i, pp. 33–37—description of the animal, its habits, distribution, products, and the manner of its capture by the natives of Blewfield (or Bluefield) River; p. 41, in Darien River; p. 321, its occurrence at Mindenao, in the East Indies; p. 381, do.; pp. 463, 469, its occurrence in New Holland; p. 547, the Manatee of Santa Hellena a Sea-Lyon [*i. e.*, a Seal]. Vol. 2, pt. ii, pp. 73, 109, 128, in Campeachy, and near Vera Cruz.

Whales and Whale-fishery of Bahia, Brazil, vol. iii, pp. 57, 58; Sea-birds feasting on a dead Whale, p. 95; Whales on the coast of New Holland, p. 131; Porpusses, p. 162, pl. ii, fig. 2.

Dampier's references to the "Manatee, or Sea-cow," as occurring in the East Indies and New Holland, relate, of course, to the Dugong. His statement that the Manatees of the West Indies are smaller than those of the American Isthmus and Guiana was seized upon by Buffon as indicating a diversity of species. [151.]

1703. La Hontan, —, Baron de. New | Voyages | to North-America. | Containing | . . . [= 20 lines]. | — | Illustrated with Twenty Three Mapps and Cutts. | — | Written in French | By the Baron Lahontan, Lord Lievtenant | of the French Colony at Placentia in New- | foundland, now in England. | — | Done into English. | — | In Two Volumes. | A great part of which never Printed in the Original. | — | London: Printed for H. Bonwicke in St. Paul's Church-yard; | T. Goodwin, M. Wotton, B. Tooke, in Fleetstreet; and S. Manship | in Cornhill, 1703. 2 vols. sm. 8°. Vol. i, ll. 12. pp. 1–280, 12 maps and cuts.

Vol. i, pp. 243-247, gives a list of the "Fish of the River *St. Laurence*," and "A Description of the Fish that are not mention'd in the Letters." The Cetaceans enumerated and described are the "Balenot," or "little Whale," the "Souffleur," and the "White Porpoise." The last is evidently the *Beluga catodon*, of which he says, "They are a ghastly sort of Animals, and are frequently taken before *Quebec*" (p. 244).

The original (French) edition, which I have not seen, is said to have been published in 1703 (La Haye, 2 vols, 12°). In the second French edition (La Haye, 1705) the matter relating to Cetaceans occurs in vol. ii, pp. 53, 55, 56. In the French editions of 1709 and 1715 (same publisher), it occurs at pp. 51, 53, 54, of the same volume. [152.]

1704. Leeuwenhoek, A. van. A Letter from Mr. *Antony van Leeuwenhoek*, F. R. S., concerning the flesh of Whales, Crystaline humour of the Eye of Whales, Fish, and other Creatures, and of the use of the Eye-lids. <*Philos. Trans. Lond.*, xxiv, no. 293 [1704], pp. 1723–1730, figg. 1–6.

The figures are of the crystalline lens of the eye of a Whale. [153.]

1704. Monck, John. An | Account | of a most Dangerous | Voyage | Perform'd by the Famous | Capt. John Monck, | In the years 1619, and 1620. | By the special Command of Christian IV. | King of Denmark, Norway, &c. to Hudson's

1704. **MONCK, JOHN**—Continued.
Straits, | in order to discover a Passage on that side, betwixt | Greenland and America to the West Indies. With a | Description of the Old and New Greenland, for the | better Elucidation of the said Treatise. | — | Translated from the High-Dutch Original, printed | at Frankford upon the Maine, 1650. <*Churchill's Coll. Voy. and Trav.*, i, 1704, pp. 541–569.

Unicorns, pp. 550, 551, figg. (skull, 3 views). [Unicorn horns an article of traffic], p. 558. Different kinds of Whales, p. 567. An Account of the Manner of catching Whales, pp. 567–569. A plate to face p. 567 gives a view of Whale-fishing, and another plate (to same p.), giving a view of a Whale lying on the shore, is entitled "A Whale Female and the Windlass whereby the Whales are brought on shore." One of the plates to p. 543 gives a view of a male Whale. [154.]

1704. "**TAPPE, D.** Fünfzehnen jährige curiose Ost-Indianische Reise-Beschreibung, so sich im Jahr Christi 1667 angefangen und im 1682 Jahre geendet hat. Hannover, Gottfr. Freytag, 1704. 4°."

"Von Fisschen, Seeläusen, Seekühen, etc., pp. 199-209."
Not seen; title and comment from Bosgoed, *op. cit.*, p. 136, no. 2146. [155.]

1705. **EDGE, THOMAS.** The Ten several Voyages of Captain Thomas Edge and others to Greenland (called by the Dutch Spitsbergen) at the Charge of the worshipful Muscovia Company. <*Harris's Coll. Voy. and Trav.*, i, 1705, pp. 572–574.

Of the several sorts of whales and the manner of killing them, p. 574. [156.]

1705. "**HARTEVSTEIN, —.** De magno pisce, qui Ionam vatim deglutivit. Witteberg, 1705. 4°."

Not seen; title from Donndorff, *Zool. Beytr.*, i, 1792, p. 776. [157.]

1705. [**MARTENS, F.**] [A Voyage to Spitzbergen, in the Ship call'd the *Jonas in the Whale*, Peter Peterson of Frieseland, Master, in 1671.] <*Harris's Coll. Voy. and Trav.*, i, 1705, pp. 617–633.

Of the Finned Fishes (includes "The Dolphin," "The Butskopf or Flounder's Head," "The Whitefish," and "The Unicorn"), p. 628. Of the Whale, pp. 629–631. The Finfish, pp. 631, 632. Plate facing p. 629 contains Martens's figures of the Whale and Finfish; also a view entitled "The Whale-fishing and killing of Morses" (two birds, a Walrus, and a small Whale in the foreground resting on the shore; a Narwhal in the water, and boats attacking Whales in the distance). The text is from Martens. The plate facing p. 617 gives another view of Whale-fishing, also from Martens. The account of the "Voyage to Spitzbergen" is an abridgment of Martens's "Spitzbergische oder Groenlandische Reise-Beschreibung gethan im Jahr 1671," Hamburgh, 1675, *q. v.* [158.]

1705. **POOL, J.** The Voyages of Mr. Jonas Pool. <*Harris's Coll. Voy. and Trav.*, i, 1705, pp. 588, 589.

Contains references to many Whales seen. [159.]

1706. **CAMELLI, G. J.** De Piscibus, Moluscis & Crustaceis *Philippensibus*. <*Philos. Trans. Lond.*, xxiv, no. 302 [1706], pp. 2043–2080 [*i. e.*, 2085–2089].

Includes a description of "Dugong Indorum." [160.]

1706. "**TYCHONIUS, TYCHO LASSEN.** Monoceros piscis haud monoceros, ad veram formam nuperi e mari Gronlandico hospitis depictus et descriptus, resp. Just. Henr. Weichbart. Havniae, 1706. 4°. pp. 16."

Not seen; title from Carus and Engelmann, ii, p. 1371. [161.]

1707. "**LARREN, —.** Monoceros piscis haud monoceros ad veram formam nuperi ex mari Groenlandico hospitis depictus et descripsus. Hafniae, 1707."

Not seen; title from Donndorff, *Zool. Beytr.*, i, 1792, p. 757. [162.]

1707. **SIBBALD, R.** Part of a Letter from *Robert Sibbald*, Knight, to Dr. *Hans Sloane*, R. S. Secr., concerning a Second Volume of his *Prodromus Historiæ Naturalis Scotiæ;* with a Description of the *Pediculus Cœti*, &c. <*Philos. Trans. Lond.*, xxv, no. 308 [1707], pp. 2314-2317. [163.]

1708. **LEGUAT, F.** A New | Voyage | To the | East-Indies | by | Francis Leguat | and | His Companions. | Containing their | Adventures in two Desart Islands, |

1708. Leguat, F.—Continued.

And an Account of the most Remarkable | Things in Maurice Island, Batavia, at the | Cape of Good Hope, the Island of St. He- | lena, and other Places in their Way to and | from the Desart Isles. | — | Adorn'd with Maps and Figures. | — | London: | Printed for R: Bonwicke, W. Freeman, Tim. Goodwin, | J. Walthoe, M. Wotton, S. Manship, F. Nicholson, B. Tooke, | R. Parker, and R. Smith. MDCCVIII. 8°. ll. 4, pp. i–xv, 1–248, ll. 12.

Porpoise, p. 7, fig. (pl. fac. p. 7). Whale, pp. 22–24. Lamentin, pp. 67–70, pl. (fac. p. 67).

The remarks about Porpoises and Whales are of interest merely for their quaintness and absurdities. The account of the Lamantin is one of the earliest descriptions of the African Manatee, and is quoted by Buffon and other early naturalists. The figure of the Lamantin displays a pig-like tusk in the lower jaw. It is represented as holding its young one in its arms. "The Lamentins, which other Nations call *Manati*, that is, *having Hands*, abound in the Sea about this Isle [Maurice], appearing often in numerous Troops . . ." (p. 67).

There is an earlier French edition of which this is a translation. [164.]

1709. Lawson, J. A New | Voyage | to | Carolina; | Containing the | Exact Description and Natural History | of that | Country: | Together with the Present State thereof | and | A Journal | Of a | Thousand Miles Travel'd thro' several | Nations of Indians. | Giving a particular Account of their Customs, | Manners &c. | By John Lawson, Gent, Surveyor | -General of North Carolina. | London, | printed in the year 1709. [No publisher.] sm. 4°. ll. 3, pp. 1–258, map, and 1 pl.

The Fish in the salt, and fresh Waters of Carolina, pp. 152–163. Of Whales he says: "Of these Monsters there are four sorts; the first . . . is the *Sperma Cœti* Whale . . ." Others mentioned are "the Bottle-nosed Whale," the "Shovel-nose," and "another sort, . . . though not common." He also speaks of the "Grampois" and "Porpoises." The short but interesting notices of these Cetaceans occur at pp. 153, 154.

This is the original edition, issued as a part of Stevens's "Collection of Voyages," of which it forms no. 2. The copy examined (in Harvard College Library) lacks the title-page, but is otherwise complete. The plate, however, is wrongly placed at p. 115 of the preceding memoir, and the map is bound at the end of the volume. The title-page appears to be lacking in many copies of the present edition. That above given is transcribed from Field.

There were later issues of the work, with different title-pages, but otherwise textually identical with the present. *See* 1714 *and* 1718. Lawson, John. The following is a transcript of the title-page of Stevens's *Collection of Voyages*, in which the work originally appeared:

A new | Collection | of | Voyages | and Travels, | Into several Parts of the World, none | of them ever before Printed in | English. | Containing, | . . . [here follow seven titles of works forming the collection, of which the second is], | 2. A new Account of Carolina, by Mr. Lawson. | — | In Two Volumes, Illustrated with several Maps and Cuts. | — | London, Printed for J. Knapton, Andrew Bell, D. Midwinter, Will. Taylor, A. Collins, and J. Baker. 1711.

The dedication, addressed to the Hon. Edmund Poley, is signed John Stevens. The date on the title-page of the first memoir is 1708.

A German translation of Lawson—Hamburg, Frankfurt, and Leipzig, sm. 8°—appeared in 1712, *q. v.* [165.]

1710. "Martens, Fred. Nauwkeurige beschryvinge van Groenland of Spitsbergen, waerin de Walvischvangst, gelegentheyd van 't ys en haer wonderlijke kracht en figuren en de visschen dezer contreyen, duydelijk wordt aengewezen. Ook hoe de walvisschen gevangen, gekapt en gesneden worden. Alsmede de Walvischvangst op rijm. Amsterdam, G. de Groot, 1710. 4°. Met gegrav. platen."

"Eene vroegere vertaling, met de reis van *Martinière* door Noorwegen, Lapland, Groenland, Nova-Zembla, enz. verscheen onder den titel: de Noordsche weereld met aanteekeningen van S. de Vries. Te Amsterdam, bij A. Dz. Ooszaen. 1685. 4°. Met platen . . . Nog twee andere uitgaven verschenen te Dordrecht, bij Hendrik Walpot. (znd. jr.) [1750? en 1760?]; en nog eene te Amst., bij Abr. Cornelis. 1770. 4°."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 242, no. 3511. [166.]

1712. [LAWSON, J.] Allerneuste Beschreibung | der Provinz | Carolina | In | West-Indien. | Samt einem | Reise-Journal | von mehr als | Tausend Meilen | unter allerhand | Indianischen Nationen. | Auch einer | Accuraten Land-Carte und andern | Kupfer-Stichen. | Aus dem Englischen [von John Lawson] übersezet durch | M. Vischer. | — | Hamburg, | Gedruckt und verlegt, durch seel Thomas von Wierings Erben, | bey der Börse im güldnen A, B, C. Anno 1712. | Sind auch zu Franckfurt und Leipzig, bey Zacharias Herteln | zu bekommen. sm. 8°. ll. 7, pp. 1-365, ll. 1½.

Fische im Saltz- und Süssen-Wasser in Carolina, pp. 232-250. Cetaceen, pp. 232-236. See original English ed., 1709. [167.]

1713. "MANDELSLO, J. A. Voyages célèbres et remarquables faits de Perse aux Indes Orientales. Contenant une description nouvelle et très curieuse de l'Indostan, de l'Empire du Grand Mogul, des îles et presqu'îles de l'Orient, des royaumes de Siam, du Japon, du Congo, de la Chine, etc. Traduits de l'original par A. de Wicquefort. Nouvelle édition, revue et corrigée. A Leide, chès Pierre van der Aa. 1713. 2 dln. 1 bd. folio. Met gegraveerde platen en kaarten."

"Baleines qui se trouvent sur les côtes du Japon, p. 464; dans la mer près de la ligne équinoctiale, p. 623; sur les côtes de l'île St. Thomas, p. 675."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 100, no. 1590. [168.]

1713. RAY, JOHN. Johannis Raii | Synopsis | Methodica | Piscium. | [Vignette.] | — | Londini: | Prostant apud W. Innys, | sub Insigni- | bus Principis in area Boreali D. Pauli. | CIↄ Iↄ CCXIII. 8°. pp. 1-166, ll. 6.

Pisces *Cetacei* seu *Bellue* marinæ = *Cetacea*, pp. 6-17, 9 spp., to wit: **1.** *Balæna* vulgaris edentula, dorso non pinnato = *Balæna mysticetus*. **2.** *Balæna* edentula corpore strictiore, dorso pinnato = *Physalus antiquorum*. **3.** *Orca* Rondel. & Bellon. = *Orca gladiator*. **4.** *Cete* Pot Walfish Batavis maris accolis dictum *Olus*. Exot. lib. 6 = *Physeter macrocephalus*. **5.** *Albus* piscis cetaceus = *Beluge catodon*. **6.** *Monodon* piscis è genere Cetaceo: *Narhual* Islandis = *Monodon monoceros*. **7.** *Delphinus* antiquorum, The Dolphin = *Delphinus delphis*. **8.** *Phocæna* Rondeletii = *Phocæna communis*. Or:

1. *Balæna* minor utraque maxilla dentata = *Orca gladiator*. **2.** *Balæna* minor, in inferiore maxilla tantùm dentata, sive pinna aut spina in dorso = *Beluga catodon*. **3.** *Balæna* major, in inferiore tantùm maxilla dentata macrocephala, bipinnis = *Physeter macrocephalus*. **4.** *Balæna* major, in inferiore tantùm maxilla dentata dentibus arcuatus falciformibus, pinnam seu spinam in dorso habens = *Physeter tursio*. **5.** *Balæna* macrocephala tripinnis, etc. = *Physeter tursio*. **6.** *Balæna* major laminas corneas in superiore maxilla habens, bipinnis, fistula carens = *Balæna mysticetus*. **7.** *Balæna* major laminas corneas in superiore maxilla habens, fistulâ donata, bipinnis = *Balæna mysticetus*. **8.** *Balæna* tripinnis, nares habens, cum rostro acuto & plicis in ventre = *Balænoptera rostrata*. **9.** *Balæna* tripinnis, maxillam inferiorem rotundam & superiore multò latiorem habens = *Physalus antiquorum*.

Eight valid species fairly defined and classified. See Clavis, p. 17. Martens's "Butz-kopf" is mentioned (p. 10), but not specifically recognized. [169.]

1714. "LAWSON, J. The | History | of | Carolina; | containing the | Exact Description and Natural History | of that Country: | Together with the Present State thereof. | And | A Journal | of a Thousand Miles, Travel'd thro' several | Nations of Indians. | Giving a particular Account of their Customs, | Manners, &c. | — | By John Lawson, Gent. Surveyor General | of North-Carolina | — | London: | Printed for W. Taylor at the Ship, and T. Baker at the Black- | Boy, in Pater-Noster-Row, 1714."

"Identical in every respect, excepting the title, with the orig. ed., 1709, *q. v.* On actual comparison, this seems to be only other copies of the original, furnished with a new title-leaf."

Not seen; title and comment from Coues, *Birds Col. Vall.*, 1878, p. 576. For account of Cetological matter see orig. ed. (1709. LAWSON, J.). [170.]

1715. ANON. "Puro e distincto ragguaglio del gran pesce chiamato Balenotto Buffalino, detto anco Capo d'Olio, preso in vicinianza del porto di Pesano 18 Aprili 1715. Venezia. folio. Met houtgrav."

Not seen; title from Bosgoed, *op. cit.*, p. 171, no. 2696. [171.]

1716. TULPIUS, N. Nicolai Tulpii | Amstelodamensis exconsulis | Observationes Medicæ. | Editio Quinta. | Cui brevis ipsius Authoris vitæ narratio | est præfixa,

1716. Tulpius, N.—Continued.
ac textuum auctorum | illustrationibus. | [Vignette.] Labore et coeli favore. | Lugduni Batavorum. |

Apud { Joh: da Vivie,
Vid & Fil. C. Boutesteyn,
Andr. Dyckhuysen,
& J. A. Langerak. |

CIↃ IↃ CCXVI. sm. 8°. ll. 10 (includes eng. title-page and illumin. title-page), pp. 1–392, ll. 2, pll. i–xviii.

Unicornu marinam, lib. iv, cap. lix, pp. 374–379, tab. xviii.

The text and plates of the body of the work in this edition, even to the pagination, are the same as the *editio nova* (1672, *q. v.*). There are added 3 prelim. leaves, giving a portrait and biography of the author; also 2 supplem. leaves of "Illustrationes textuum Hippocratis," etc., by Abraham Salomon vander Voort. [172.]

1718. Jonston, J. Theatrum | universale omnium | Animalium | Piscium, Avium Quadrupedum, | Exanguium, Aquaticorum, Insectorum, | et Anguim, | CCLX. Tabulis ornatum, | Ex Scriptoribus tam antiquis quam recentioribus, | Aristotele, Theophrasto, Dioscoride, Æliano, Oppiano, Plinio, Gesne- | ro, Aldrovando, Wottonio, Turnero, Mouffeto, Agricola, Boetio, | Baccio, Ruveo, Schonfeldio, Freygio, Mathiolo, Tabernomontano, | Bauhino Ximene, Bustamantio, Rondeletio, Bellonio, Cæsio, The- | veto, Margravio, Pisone, & aliis maxima curâ à J. Jonstonio collectum, | Ac plus quam Trecentis Piscibus | Nuperrime ex Indiis Orientalibus allatis, | Ac nunquam antea his terris visis, locupletatum; cum Enumeratione morborum, | quibus Medicamina ex his Animalibus petuntur, ac Notitiâ Animalium, | ex quibus vicissim Remedia præstantissima possunt capi; cura | Henrici Ruysch M. D. Amstelæd. | VI. Partibus, Duobus Tomis, comprehensum. | Tomus I. | [Seal.] | Amstelædami, | Prostat apud R. & G. Wetstenios. | — | MDCCXVIII. 2 vols., 2°.

Tomus i. Continet | Collectionem Novam Piscium Amboneusium ac Historiam Naturalem | Piscium, & Avium. [Pars prima], ll. 2, pp. 1–40, pll. i–xxi. [Pars secunda]. Historia naturalis Piscium, cura H. Ruysch, pp. 1–160, pll. i–xlviii. Theatri universalis | Animalium | pars secunda. | Sive Historiæ Naturalibus | de | Avibus | Libri vi, | . . . | Cura Henrici Ruysch, . . . ll. 7, pp. 1–160, pll. i–lxii.

Historiæ naturalis de Piscibus. Liber v. De Cetis, pp. 150–157, pll. xli–xliv, pl. xlv [fig. 1]. pl. xlvii.

Caput i. De Cetis in genere, pp. 150, 151; Caput ii. De Cetis in specie. Articulus i, De Balæna, pp. 151, 152, pll. xli, xlii; Articulus ii, De Balæna vulgi, & Physetere, pp. 152, 153; Articulus iii, De Puste & Orca, pp. 153, 154, pl. xliii; Articulus iv, De Delphino, pp. 154, 155, pl. xliv; Articulus v, Phocæna & Scolopendra Cetacea, pp. 155, 156; Articulus vi, De Phoca, seu Vitulo marino, pp. 156, 157, pl. xli; Articulus vii, De Manati Indorum, p. 157, pl. xliii. Additamentum de cane Aristotelis, pp. 158, 159. Ad Librum v, De Phoca, p. 159. Figuri lviii [= pl. xlviii]. Appendix Nova de Unicornu Marino, p. 160.

This work is a reprint of the "Historia naturalis de Piscibus et Cetis" of Joh. Jonston (1650, *q. v.*), and of the "Historia naturalis de Avibus" of the same author, with the "Collectio Nova Piscium Amboinensium partim ibi ad vivum delineatorum, partim et Museo Henrici Ruysch M. D." prefixed, and an original addendum to Liber v (De Cetis) of the "Historia naturalis de Piscibus, consisting of p. 160 and pl. xlviii. The text and the figures are otherwise as in Jonston at 1650, except that the latter are colored. Pl. xlviii gives two figures of the Narwhal (figg. 5 and 6), three views of the skull (figg. 1, 3, 4), and two (figg. 2 A, B. of the tusk. This edition of the "Theatrum" is often cited under Ruysch, H., who was author of part of the work, as now constituted, as well as editor. [173.]

1718. Lawson, J. The | History | of | Carolina; | containing the | Exact Description and Natural History | of that | Country; | Together with the Present State thereof. | And | A Journal | Of a Thousand Miles, Travel'd thro' several | Nations of Indians, | Giving a particular Account of their Customs, | Manners, &c. | — | By John Lawson, Gent. Surveyor-General | of North-Carolina. | — | London: | printed for T. Warner, at the Black-Boy in Pater-Noster | Row, 1718. Price Bound Five Shillings. sm. 4°. ll. 3, pp. 1–258, map and 1 pl.

1718. Lawson, J.—Continued.

This edition appears to be merely other copies of the original edition, issued, like the ed. of 1714 (*q. v.*), with a new title-page. The present title-page differs from that of the 1714 ed. only in the bookseller's imprint. The Cetological matter is, of course, the same as in the earlier editions. Field states that "Neither of the first three editions of Lawson's work is often found complete, with the map, and animal plate." The copy of the present edition examined by me lacks the map, but has the plate. [174.]

1718. Ruysch, Henry. *See* 1718. Jonston, J. [175.]

1719. Stukely, W. An Account of the Impression of an almost Entire Sceleton of a large Animal in a very hard Stone, lately presented to the *Royal Society* from *Nottinghamshire.* <*Philos. Trans. Lond.*, xxx, no. 360 [1719], pp. 963–968, 1 pl.

Possibly a *Phocæna.* The plate represents the bones of nearly all but the head of the partially preserved animal *in situ.* [176.]

1720. Zorgdrager, C. G. C: G: Zorgdragers | Bloeyende Opkomst der Aloude en Hedendaagsche | Groenlandsche | Visschery. | Waer in met eene geoffende ervaarenheit de geheele om- | slag deezer Visscherye beschreeven, en wat daar in | dient waargenomen, naaukeurig verhandelt wordt. | Uitgebreid | Met eene korte Historische Beschryving der Noordere Gewesten, | voornamentlyk Groenlandt, Yslandt, Spitsbergen, Nova | Zembla, Jan Mayen Eilandt, de Straat Davis, en | al 't aanmerklykste in d' Ontdekking deezer | Landen, en in de Visschery voorgevallen. | Met byvoeging van de | Walvischvangst, | In haare hoedanigheden, behandelingen, 't Scheeps- | leeven en gedrag beschouwt. | Door | Abraham Moubach. | Verciert met naaukeurige, correcte en naar 't leven geteeken- | de nieuwe Kaarten en kunstige Printverbeeldingen. | [Vignette.] | T' Amsterdam. | By Joannes Oosterwyk, | Boekverkooper op den Dam, 1720. sm. 4°. ll. 18, pp. 1–330, ll. 7, maps 6, pll. 7, and frontispiece.

Engr. title-page frontispiece, pl. back; printed title-page (as above given), illuminated, pl. back; half-title, backed by poem entitled "Verklaaring vande tytelprint," signed A. Bógaert; "Aan de Heeren Gecommitteerden der Hollandsche Groenlandsche Visschery," 2 leaves; "Aan den Lezer," signed A. Moubach, 4 leaves. Korte inhoudt der Hoofdtstukken, 1 leaf.

Eerste Deel. Inleiding. Handelende van d' eerste Kust en Land-Ontdekkers in 't algemeen, 9 leaves and 2 maps (no. 1, Nieuwe Kaart van de Noord-Pool; No. 2. Nieuwe Kaart van Oud en Nieuw Groenland als meede van de Straat Davis). I. Hoofdtstuk. Van d' eerste Ontdekkers van Groenland, en wie die waren, enz., pp. 1–5. II. Hoofdt. Ongemeene Vischrykheit der Groenlandsche Zee; en omstandig bericht van d' Eenhoorns gegeeven, pp. 6–10, pl. facing p. 7 [three views of the skull]. III. Hoofdt. Gesteltheit en gematigheit der Oud-Groenlandsche Lucht, enz., pp. 10–12. IV. Hoofdt. Vruchtelooze togten der Deenen naar Groenlandt, enz., pp. 12–21. V. Hoofdt. Groenlandsche Compagnie te Koppenhagen opgerecht, zend Schapen naar de Straat Davis, pp. 21–25. VI. Hoofdt. Onderzoek over Groenlandts strekking naar Tartarië en America, en bericht over Spitsbergens byzonderheden, enz., pp. 24–34. VII. Hoofdt. Yslandts strekking en uitgestrektheit, eerste Ontdekkers, en's Lands gelgentheit, en., pp. 34–47, enz Nieuwe Kaart van Ysland (p. 34), [pl. facing p. 38 eruption of a geyser]. VIII. Hoofdt. Handel en bedryf der Yslanders onderzocht, pp. 47–49. IX. Hoofdt. 't Aloude Landbestier van Yslandt, invoering van 't Kristendom, enz., pp. 49–53. X. Hoofdt. Zeemagt der Yslanders eertyds, en d' aloude Bevolkers naagespeurt, pp. 53–60. XI. Hoofdt. Verscheide gevoelens wegens Yslandts bevolking onderzocht, pp. 60–66.

Tweede Deel. I. Hoofdt. Eerste Ontdekkers van Spitsbergen, en waarom dus genoemt, enz., pp. 67–71, en Nieuwe Kaart van 't Eyland Spitsbergen (p. 67). II. Hoofdt. Ongemeene koude te Spitsbergen, en den aart der Verheevelingen beschreeven, enz., pp. 71–75 [pl. facing p. 74 gives figures of a solar halo and various forms of snow-crystals]. III. Hoofdt. Gesteltheit van 't Ys omtrent Spitsbergen, enz., pp. 75–78. IV. Hoofdt. Spitsbergen en Jan Mayen Eilandt, eertyds Vischryke Gewesten, enz., pp. 78–80, en kaart Jan Mayan Eyland, p. 79. V. Hoofdt. Veelerly soorten van Walvisschen, waar onder d' Eilandische Walvisch de voornaamste is, enz., pp. 80–87, en pl. p. 81, Walvisch achter over gekant zynde; Gapende Walvisch waar in den Stant der Barden werd aan geweezen. VI. Hoofdt. Eilandsche Walvisschen waar zich onthouden. 't Walvischaas beschreeven en waar meest gevonden word, enz., pp. 87–90. VII. Hoofdt. Noordkapers Gewest beschreeven, als mede dat der Vinvisschen, enz., pp. 91–98 [the pl. facing p. 7 gives a figure of the "Vinvisch" described at p. 92]. VIII. Hoofdt. Of de Biskayers d' eerste aanleiders tot de Walvischvangst zyn ge-

1720. **Zorgdrager, C. G.**—Continued.

weest, enz., pp. 98–103. IX. Hoofdt. 't Walvisch Gewest van een ruime uitgestrektheit beschouwt, enz., pp. 103–106. X. Hoofdt. Verscheide gevoelens over den doortogt door de Waigats onderzocht, pp. 106–123, en Nieuwe Kaart van Nova Zembla en 't Waygat, enz., p. 106. XI. Hoofdt. Hoedanig de Walvisschen tot in de Tartarische Zee doordringen onderzocht, enz., pp. 123–134. XII. Hoofdt. Gedachten over de warmte der Zon en haare werkzaamheit, enz., pp. 134–139. XIII. Hoofdt. Koerschouding der Zuidys Visschen, en hoe men die moet opspeuren, enz., pp. 140-150. XIV. Hoofdt. Zuidys Visschen van hun gewoon Gewest kundig, en hunne vlucht voor den komst der Groendlandsche Vloot, enz., pp. 150–156.

Deerde Deel. I. Hoofdt. Westys Visschen waar voornamentlyk gevonden. Vaart op Spitsbergen begonnen en wanneer, enz., pp. 157–164 [pl. facing p. 162, figg. of "Walrus" and "Zee Rob"; also "Cachelot of Potvisch"]. II. Hoofdt. Walrussen en Robben hoedanig gevangen, enz., pp. 165–172. III. Hoofdt. Eerste opkomst der Walvischvangst, die voordeelig was, en door Compagnieschap omtrent de Bayen van Spitsbergen geoffent wierd, enz., pp. 172–175 [*i. e.*, 185; pp. 184 and 185 are erroneously paged 174–175]. IV. Hoofdt. De Groenlandsche Maatschappy allenks weder gezwakt en om wat reden, enz., pp. 175 [*i. e.*, 185]-197. V. Hoofdt. Eilandsche Walvisch von voor Spitsbergen verjaagt, en de Zoevisschery ondernomen, enz., pp. 197–203. VI. Hoofdt. Ysvisschery ondernomen, en hoedanig. De wykende Visschen nagespeurt, pp. 203–208 [pl. facing p. 204 gives a view of a fleet of vessels engaged in ice-fishing]. VII. Hoofdt. Westysvisschery hoe verre zich uitstrekt. Hooge Graden gereeder dan laage om Visch op te doen, enz., pp. 208–211. VIII. Hoofdt. Werwaarts de Visch te vinden, wanneer plaatsen en tyden wel worden onderscheiden, enz., pp. 211–215. IX. Hoofdt. Visschery op laage Graden wanneer tydig is; Oud-Groenlands strekking voor wiens Kusten Walvischaas gevonden word, waar zich veel Visch onthoud, enz., 215–221. X. Hoofdt. Overwintering op Spitsbergen. Verscheide Observatiën over 't Noorderlicht, pp. 221–235. XI. Hoofdt. Verscheide vreemde ontmoetingen en ongevallen den Groenlandsvaarders bejegent. Loosheit tusschen de West en Zuidys Visschen hoe t' onderscheiden, enz., pp. 235–247 [pl. facing p. 239, ships in the ice]. XII. Hoofdt. Zaaken wegens de Visschery noodig in acht te neemen, enz., pp. 248–260. XIII. Hoofdt. Misbruik in den Traan- en Baarden handel afgeschaft. Voordeelen door de Visschery sedert eenige Jaaren behaalt, enz., pp. 260–283; Byvoegsel [description of Cachelot], p. 234; Groenlandsche Walvischvangst in haar byzonder Sheepsleven en gedrag beschouwt, pp. 287–330.

Toegift voor de Groenlandschvaarders en Matroozen [poem], 1 leaf. Bladwyzer der voornaamste Zaaken, 5 leaves. Drukfeilen, 1 page, backed by publisher's list of books.

Zorgdrager's work is by far the most important of the early authorities on the Northern Whalefishery, and must always be one of the chief sources of information for the early history of the subject. It also gives one of the best figures of the Greenland Right Whale (*Balæna mysticetus*) published prior to the present century, and also one of the best early figures of the Cachelot. Chap. xiii of pt. iii is statistical, giving the number of Dutch and Hamburg ships annually engaged in the Greenland Whalefishery from the year 1670 to 1719, the number lost each year, the number of Whales killed, the yield of oil and bone, and its value. Also the names of the directors of Whalefishery companies, and of the masters of the vessels engaged in Whalefishing from the Dutch, Hamburg, and Bremen ports. The closing pages of the work give details of the equipment and expenses of vessels engaged in Whaling, etc.

The general character of the work is sufficiently indicated by the abbreviated chapter-headings above given, which are a transcript of the table of contents.

The German version (Leipzig, 1723, 4°, *q. v.*) is a translation of the present edition. A second Dutch edition, revised and enlarged by the author, was published at Gravenhage in 1727 (*q. v.*), which was reissued, with new title-page but otherwise the same, at Amsterdam in 1728. The only other edition which I have seen is the German edition published at Nürnberg in 1750, *q. v.* [177.]

1721. **Oliver, W.** Remarkables in a Journey through *Denmark* and *Holland*. <*Philos. Trans.*, *Abridged by Jones*, 1700–1720, v, pt. 2, 1721, pp. 128–134.

From *Philos. Trans. Lond.*, no. 285, p. 1400. Contains a notice of the horn of a Sea-Unicorn [*Monodon monoceros*] brought from Greenland. [178.]

1721. **Sibbald, R.** Of the *Pediculus Ceti*. <*Philos. Trans.*, *Abridged by Jones*, 1700–1720, v, pt. 1, 1721, pp. 25, 26, fig. 32.

From *Philos. Trans. Lond.*, no. 308, p. 2314. [179.]

1722. **Anon.** A Summary Relation of the Discoveries about the *North East Passage*. <*Philos. Trans.*, *Abridged by Lowthorp* [1665–1700], iii, 1722, pp. 610–614.

Notice of the reported passage of a Whale through the North-East passage. From *Philos. Trans. Lond.*, no. 118, p. 417. [180.]

1722. ANON. Whales and Whale Fishing about Bermudas. <*Philos. Trans.*, *Abridged by Lowthorp* [1665–1700], ii, 1722, pp. 842–845.

From *Philos. Trans. Lond.* [i], no. 1, p. 11[–13]; no. 8, p. 132 [133]. See *suprà*, ANON, at 1665. [181.]

1722. [LABAT, R. P.] Nouveau | Voyage | aux Isles | de l'Amerique, | contenant | l'Histoire Naturelle de ces Pays, | l'Origine, les Mœurs, la Religion & le Gouver- | nement des Habitans anciens & modernes. | Les Guerres & les Evenemens singuliers qui y sont | arrivez pendant le long sejour que l'Auteur y a fait. | Le Commerce & les Manufactures qui y sont établies, | & les Moyens de les augmenter. | Avec une Description exacte & curieuse | de toutes ces Isles. | Ouvrage enrichi de plus de cent Cartes, Plans, | & Figures en Tailles-douces. | [Par Jean Pierre Labat.] Tome Premier[–Seizième]. | [Design] A Paris, Rue S. Jacques, | Chez Pierre-François Giffart, près | la ruë des Mathurins, à l'Image | Sainte Therese. | — | M. DCC. XXII. | Avec Approbation & Privilege du Roy. 6 vols. 12°.

Description d'un poisson appellé Lamentin ou Manati, vol. ii, pp. 200–207, pl. fac. p. 200.—Very full original account of external characters and mode of capture, with an original figure—an adult clasping its young one to its breast. The figure, slightly altered, is given by Bellin, 1763, *q. v.* [182.]

1722. LISTER, M. A venomous-scratch with the Tooth of a Porpus. <*Philos. Trans.*, *Abridged by Lowthorp* [1665–1700], ii, 1722, p. 842.

From *Philos. Trans. Lond.* [xix], no. 233, p. 726. [183.]

1722. MOLINEUX, G. Several Things in *Ireland* in common with the *West Indies.* <*Philos. Trans.*, *Abridged by Lowthorp* [1665–1700], iii, 1722, pp. 544–546.

From *Philos. Trans. Lond.* [xix], no. 227, pp. 507[–511]. See *suprà*, this author, at 1697.

Relates to that portion only of Dr. Molyneux's discourse which treats of ambergris, spermaceti, and certain plants found in Ireland. [184.]

1722. STAFFORD, R. [Concerning Spermaceti Whales about the Bermudas.] <*Philos. Trans.*, *Abridged by Lowthorp* [1665–1700], ii, 1722, p. 845.

From *Philos. Trans. Lond.* [iii], no. 40, p. 793 [=792–795]. See *suprà*, this author, at 1668. [185.]

1723. ZORGDRAGER, C. G. "Alte und neue Grönländische Fischerei und Wallfischfang mit einer kurzen histor. Beschreibung von Grönland, Island, Spitsbergen, Nova Zembla u. s. w. ausgefertigt durch *A. Moubach.* Aus dem Holländischen übersetzt. Leipzig, 1723. 4°. Met kaarten en platen."

Not seen; title from Bosgoed, *op. cit.*, p. 253, no. 3616. [186.]

[1724.] BOYLSTON. *Ambergris* found in *Whales.* <*Philos. Trans. Lond.*, xxxiii, no. 385 [1724], p. 193.

The writer, Dr. Boylston, of Boston, Mass., states that according to the testimony of whalemen ambergris is found in a cyst near the genital parts of Whales—probably the first announcement of its real source. [187.]

1725. DUDLEY, PAUL. An Essay upon the Natural History of Whales, with a particular Account of the Ambergris found in the *Sperma Ceti* Whale. In a letter to the Publisher, from the Honourable *Paul Dudley*, Esq.; F. R. S. <*Phil. Trans. Lond.*, xxxiii, no. 387, "for the Months of March and April, 1725" (volume dated 1726), pp. 256–269.

"But here I would have it noted, that the following Account respects only such Whale, as are found on the Coast of *New England*" (p. 256). This short account of 14 pp. is the first of importance relating especially to the Whales of the New England coast, in fact, is almost the only one to the present date. The "divers Sorts or Kinds" mentioned are, 1. The "Right, or Whalebone Whale" (pp. 256, 257); 2. The "Scrag Whale"; 3. The Finback Whale"; 4. The "Bunch or humpback Whale" (p. 258); 5. The "*Sperma Ceti* Whale" (pp. 258, 259); 6. The "Killer . . . without doubt the *Orca* that Dr. *Frangius* (*lege* Franzius) describes . . ." p. 265.

Several of these became later the basis of species of systematic writers. Although described briefly, their characters are so well indicated that it is not difficult to identify the species in the light of present knowledge of the subject. Other portions of the memoir are devoted to an account of "*Sperma Ceti* Oil" (pp. 259, 260), "of the Ambergris" (pp. 266–269), to the habits of Whales, and to the "Way and Manner of killing Whales."

On the Killer of Dudley, *cf.* HAMEL, *Proceed. Am. Assoc. Adv. Sc.*, viii, 1855. [188.]

1725. "HEERFORT, CHRISTOPH. Diss. hist.-phys.-crit. de Sirenibus, seu piscibus humani corporis structuram quodammodo imitantibus. Resp. Andr. Bing. Hafniae, 1725. 4°. pp. 20."

Not seen; title from Carus and Engelmann. [189.]

1726. "HERRARA, A. DE. Historia General de los Hech^{ts} de los Castellanos en las Islas i Terra Firme del Mar Oceano. Escrita por Antonio de Herrara, Coronista Mayor de su m^{d} de las Indias y sv Coronista de Castilla, En quatro Decadas desde el Año de 1492, hasta el de [1]531. 4 vols., folio, vellum. En Madrid en la Imprenta Real de Nicolas Rodriguez franco Añ de 1726."

Not seen; title from Field (*Cat. Libr.*, 1875, p. 132, no. 964). For the reference to Manati, see ed. of 1728. [190.]

1727. STALPARTIUS, C., VANDER WIEL. C. Stalpartii vander Wiel | Medici Hagiensis | Observationum | Rariorum | Medic. Anatomic. | Chirurgicarum | Centuria Prior, | Accedit | De Unicornu | Dissertatio. | Vtraque tertia parte auctior, longeqne | emendatior. | Editio novissima. | [Design.] Leidae, | Apud Joannem à Kerkhem, 1727. sm. 8°. ll. 17 (including frontis., eng. title, plain title, etc.), pp. 1–516, ll. 8, pll. i–ix.

De Unicornu Dissertatio, pp. 463–516, pl. ix. Contains references *passim* to the Narwhal. [191.]

1727. ZORGDRAGER, C. G. C:[ornelis] G:[ijsbertsz] Zorgdragers | Bloeijende Opkomst der Aloude en Hedendaagsche | Groenlandsche | Visschery. | Waar in met eene geoeffende ervaarenheit de geheele om- | slag deezer Visscherye beschreeven, en wat daar in | dient waargenomen, naaukeurig verhandelt wordt. | Uitgebreid | Met eene Korte Historische Beschryving der Noordere Gewesten, | voornamentlyk Groenlandt, Yslandt, Spitsbergen, Nova | Zembla, Jan Mayen Eilandt, de Straat Davis, en | al 't aanmerklykste in de Ontdekking deezer | Landen, en in de Visschery voorgevallen. | Met byvoeging van de | Walvischvangst, | In haare hoedanigheden, behandelingen, 't Scheeps- | leeven en gedrag beschouwt. | Door | Abraham Moubach. | Tweeden Druk. | Met aanmerkelyke zaaken vermeerdert, | nevens een Korte Beschryving | Van de | Terreneufsche Bakkeljaau-Visschery. | Verciert met naauwkeurige, en naar 't leven geteekende | nieuwe Kaarten en kunstige Printverbeeldingen. | [Vignette] In s' Gravenhage. | By P. van Thol en R. C. Alberts, Boekverkopers, 1727. | sm. 4°. ll. 20, pp. 1–392, ll. 7, 6 maps, 7 pll. (and frontispiece?)

The copy examined lacks the frontispiece of the first edition, which must, however, have been lost, as the poem explanatory of it backs the half-title leaf.

This edition differs from the first (1720) through the addition of some 60 pp. of new matter, including nearly 20 pp. on the Newfoundland Cod-fishery. To the second part (Tweede Deel) six chapters are added, giving nearly 20 pp. of new matter; there are, besides, considerable additions at other points, together with omissions of matter contained in the first edition, so that portions of Part ii are practically rewritten. The account of the Potvisch or Cachelot is transferred from the Appendix to near the middle of Part ii, but the plate illustrating the Walrus, Seal, and Cachelot is omitted (at least is lacking in the copy collated). The only new illustration added is the plate facing p. 21, giving figures of an Eskimo boat. The statistical portion is brought down to 1725.

The chapters apparently newly added are: II Deel. I. Hoofdt. Strekking der Kusten in en omtrent de Straat-Davis, en welke koes men om de zelve te bevaren, te houden heeft, enz., pp. 71–73. II. Hoofdt. Aart en hoedanigheit, kleeding en gedrag der Inboorlingen omtrent de Straat-Davis Kusten, enz., pp. 74–79. III. Hoofdt. Landdieren en 't Gevogelte der Straat-Davis Gewesten; hoe verre zich de gewoone Wischplaats uitstrekt, enz., pp. 79, 80. IV. Hoofdt. Verraaderschen aart van eenige Bewooners der Straat-Davis Kusten, en hoe men zich daar voor te wachten heeft, enz., pp. 81–83. V. Hoofdt. Westkust van de Straat-Davis en den aart der Bewoonders Beschreeven, pp. 83, 84. XVI. Hoofdt. Verscheiden middelen aangewent, uitgevonden en in 't werk gestelt om de lengte van Oost en West daar uit te vinden, doch te vergeess, pp. 153–157.

For further list of contents and comments see the first edition (1820).

This edition was reissued, according to bibliographers, at Amsterdam the following year (1728), with a new title-page but otherwise unchanged, forming the third Dutch edition. [192.]

1728. Herrara, Antonio de. Historia general | de las | Indias ocidentales; | Ò | de los Hechos | De los Castellanos en las Islas y Tierra firme | del Mar Oceano, | Escrita | por | Antonio de Herrara | coronista mayor de su Magestad | de las Indias y de Castilla. | En ocho decadas. | Sigue a la ultima decada | la | Descripcion de las Indias | por el mismo Autor. | Tomo Primero[–quarto], | que contiene las decadas | primera y segunda. | Nueva Impression enriquecida con lindas Figuras | y Retratos. | En Amberes, | Por Juan Bautista Vèrdussen, Mercador de Libros. M. D. CC. XXVIII. 4 vols. fol. Vol. i, ll. 2 (incl. eng. title-page), pp. 1–496, ll. 12, pll.

The first edition of this work (given above from Field) appeared in 1726, *q. v.*

El Manati, vol. i, dec. i, cap. xi, p. 118 (one-third page). A slightly abridged paraphrase of Gomara's account (*see* 1554. Gomara, L. F. de). [193.]

1730. Herrara, A. de. Historia gene | ral de los Hechos | delos Castellanos | enlas Islas i Tierra Fi | rme del Mar Oceano. Es | crita por Antonio de | Herrara Coronista | Mayor de sv M^{d}. de las | Indias y sv Coronis- | tade Castilla | En quatro Decadas des de el Año de | 1492 hasta el de [1]531. Decada primera— Al Rey Nu^{ro}. Señor, | Eu Madrid | en la Imprenta | Real | de Nicolas Rodiguez [*sic*] | franco | Año de 1730. 4 vols. fol.

Los Manati, dec. i, pp. 141, 142. [194.]

There is another edition of this date differing apparently only in the title-page, as follows:

1730. Herrara, A. de. Descripcion de | las Indias ocide | ntales de Antonio | de Herrera coro- | nista mayor de | sv Mag^{d}. de las Indias, y su Coronista | de Castilla. | Al Rey Nro Señor | En Madrid enla Oficina Real | de Nicolas Rodriguez Franco Año de 1730. Eng. title-page. 4 vols. fol.

Los Manati, dec. i, pp. 141, 142. [195.]

1731. La Peyrere, —. Relations | de | l'Islande, | et du | Greenland, Par la Peyere, Auteur des Præadamites. <*Recueil de Voyages au Nord*, Contenant divers Mémoires très utiles au Commerce & à la Navigation. Tome premier. Nouvelle édition, corrigée & mise en meilleur ordre. Amsterdam, 1731.

The letter is dated "De la Haye le 13 Juin, 1646."

Pp. 93–107 are devoted to a discussion of the question whether the so-called horn of the Narwhal is a tooth or a horn, and whether therefore the Narwhal is a fish. The conclusion reached is that the "horn" is a tooth "de ce poisson, que les Islandois apellent *Narhual*, & que ce n'est point une corne" (p. 106). The etymology of the Icelandic word *Narhual* is said to be *Hual*, whale, and *Nar*, signifying a cadaver, because this whale feeds on cadavers (p. 97). The animal and skull are figured in the plate facing p. 186 with the following legends: Poisson nommé par les Islandois *Narwal* qui porte la corne, ou dent, que l'on dit de Licorne. Teste de Poisson *Narwal*, avec un troncon de sa dent, ou de sa corne, long de quatre pieds. The figures are copies from Tulpius, 1672 (*q. v.*). [196.]

1732. "Janiçon, F. H. De republiek der Vereenigde Nederlanden. Uit het Fransch. 's Gravenhage, J. van Duren, 1732. 4 dln. 16°."

Kompagnie van 't noorden of van den walvischvangst, ii, pp. 280–291.

Not seen; title and reference from Bosgoed, *op. cit.*, p. 239, no. 3485. [197.]

1732. Martens, F. Journal d'un Voyage au Spitzberguen &c. par Frédéric Martens de Hambourg, traduit de l'Allemand. <*Recueil de Voyages au Nord*, ii (nouvelle édition), 1732, l. 1, pp. 1–282.

Du Dauphin, pp. 185–187. Du Butskopf, ou Tête de Plie, pp. 187–189. Du Poisson blanc, pp. 189, 190. De la Licorne, pp. 190, 191. De la Baleine, pp. 196–221, pl. fac. p. 196. De la maniére dont on prend les Baleines, pp. 221–238, pl. fac. p. 222. Ce qu'on fait d'une Baleine morte, pp. 239–247. De la maniére dont on tire l'huile . . . de la graise, pp. 248–251. Du Poisson à nageoires, autrement Winne-fish, pp. 251–256. Addition qui concerne la Péche de la Baleine, pp. 267–282. [198.]

1733. Bajer, Joh. Jac. "De pisce praegrandi Mular. <*Acta Acad. Leop. Carol. Nat. Cur.*, iii, 1733, pp. 2–6, pl."

Not seen; title from Carus and Engelmann. [199.]

1734. Boylston, *Dr.* *Ambergris* found in *Whales*, communicated by Dr. *Boylston* of *Boston* in *New England*. <*Philos. Trans., Abridged by Eames and Martyn*, 1719–1733, vii, pt. 3, 1734, pp. 423, 424.

From *Philos. Trans. Lond.*, no. 385, p. 193. *See suprà*, Boylston, at 1724. [200.]

1734. Dudley, P. An Essay upon the Natural History of Whales, with a particular Account of the Ambergris found in the *Sperma Ceti* Whale. <*Philos. Trans., Abridged by Eames and Martyn*, 1719–1733, vii, pt. 3, 1734, pp. 424–431.

From *Philos. Trans. Lond.*, no. 387, p. 256. *See suprà*, Dudley, P., at 1725. [201.]

1735. Atkins, J. A | Voyage | to | Guinea, Brazil, and the | West-Indies; | In His Majesty's Ships, the Swallow | and Weymouth. | Describing the several Islands and Settlements, viz– | Madeira, the Canaries, Cape de Verde, Sierraleon, Sesthos, | Cape Apollonia, Cabo Corso, and others on the Guinea Coast; | Barbadoes, Jamaica, &c. in the West Indies. | The Colour, Diet, Languages, Habits, Manners, Customs, | and Religions of the respective Natives and Inhabitants. | With Remarks on the Gold, Ivory, and Slave-Trade; | and on Winds, Tides, and Currents of the several Coasts. | — | By John Atkins, | Surgeon in the Royal Navy. | — | . . . [= quotation, 4 lines.] | [Vignette—ship.] London: | Printed for Cæsar Ward and Richard Chandler, at the | Ship, between the Temple-Gates in Fleet-Street; And Sold at their | Shop in Scarborough. M. DCC. XXXV. 8°. l. 1, pp. i–xxv, 1–265.

The *Manatea* (in the Sierraleon River), pp. 42, 43. Its external characters and mode of its capture by the Negroes. [202.]

1735. Editor. Editoris *Recensio* Experimentorum circa *Ambram Gryseam* à Domino *Joh. Browne*, R. S. S. *&* à Dno. *Ambrosio Godofredo* Hauckewitz, R. S. S. institutorum, cum *D. Neumanni*, R. S. S. Experimenti sui *vindicatione*. <*Philos. Trans.*, *Lond.*, xxxviii, no. 435, 1735, pp. 437–440. [203.]

1735. Neumanno, C. De *Ambra Grysea*. <*Philos. Trans.*, *Lond.*, xxxviii, no. 433, 1735, pp. 344–370; no. 434, pp. 371–402; no. 435, pp. 417–437. [204.]

1736. D[espars]., N., *en* F. R. "Chronyke van Vlaenderen, vervattende haere vindinge, naem, enz., alsook eene generale beschryvinghe van g'heel haer bestreck, steden, casteelen, heerlyckheden, enz. Beginnende van 't jaer 621–1725. Door N. D(espars) en F. R. Met kopere platen. Brugge, Andr. Wijdts, 1736. 3 dln., 4 stukken folio."

"Zie aldaar: Groenland's vaerders, d' eerste in see gesonden door van Brugge. Ao. 1665, iii, bl. 728, 731, 747. De visscherij belooft een goeden uitslag. De Franschen nemen eenige visschers met hunne schepen, die sy beswaerlyk doen afkopen, ii, bl. 432.

Not seen; title and references from Bosgoed, *op. cit.*, p. 249, no. 3579. [205.]

1736. Langen, Jo. Jac. "Nachricht von dem *Unicornu marino*, oder Meereinhorn, welches in Halle 1736 ist zu sehen gewesen. <*Hallischen Anzeiger*, no. 19, 1736."

Not seen; title from Egede. [206.]

1736. Qvellmalz, Sam. Theod. "Observationes de unicornu marino, ex vicinia Bremensi Lipsam delato. <*Commerc. litter. Norw.*, 1736, hebd. xxii, no. 4, pp. 171–273."

Not seen; title from Egede. [207.]

1737. Brickell, J. The Natural | History | of | North-Carolina. | With an | Account | of the | Trade, Manners, and Customs of the | Christian and Indian Inhabitants. Il- | lustrated with Copper-Plates, whereon are | curiously Engraved the Map of the Country, | several strange Beasts, Birds, Fishes, Snakes, | Insects, Trees, and Plants, &c. | — | By John Brickell, M. D. | — | Nostra nos in urbe peregrinamur. Cic. | — | Dublin. | Printed by James Carson, in Coghill's-Court, Dame- | street, opposite to the Castle-Market. For the Author, | 1737. 1 vol. 8°. pp. i–vii, 1–408, woodcuts, map, and 2 folding plates of animals.

Of the Fish of North Carolina, pp. 215–249. The cetological matter occupies pp. 215–226. Pages 215–220, including the first half of the latter, appear to relate in a general and rather vague way to the Right Whale of the North Atlantic (*Balæna cisarctica*, Cope), but beyond a few particulars respecting their capture near Ocacock Island, there is nothing of much value. The two pages next following are merely a paraphrase of Lawson's account of different "sorts of Whales;" there then follow two paragraphs of original matter, the latter treating of "the Porpoise, or Sea-Hog." The next reference to Cetaceans is at p. 226, which is devoted to an account of "the Dolphin," and is also new matter.

1737. BRICKELL, J.—Continued.

Field states that Brickell "stole the material" for his work from Lawson, "with scarcely any disguise," and Coues refers to "a 4th ed. [of Lawson], Dublin, 1737, attributed to Brickell." It is true that Brickell stole much of his material from Lawson, but to speak of Brickell's work as a 4th edition of Lawson is quite misleading, since for the first 60 pp. of Lawson there is nothing to correspond in Brickell. The part relating to the Indians is not only substantially the same in both, but considerable portions are identical in phraseology. The "Description of North Carolina" and the "Natural History of North Carolina" given by Lawson form the basis of the Natural History portion of Brickell's work, the latter having incorporated nearly all that the former has said, generally in Lawson's own words, but with the matter more or less transposed and augmented by often merely verbal additions. Brickell has, however, added much that is new, and based evidently on his own observations, some of Lawson's paragraphs being expanded by Brickell to several times their original length by the addition of wholly new and often important matter. [208.]

1738. ARTEDI, P. Petri Artedi | sveci, Medici Ichthyologia | sive | opera omnia | de | Piscibus | scilicet: | Bibliotheca Ichthyologica. | Philosophia Ichthyologica. | Generum Piscium. | Synonymia specierum. | Descriptiones specierum. | Omnia in hoc genera perfectiora, | quam Anthea ulla. | Posthuma | Vindicavit, Recognovit, Cooptavit & Edidit | Carolus Linnæus, | Med. Doct. & Ac. Imper. N. C. | — | Lugduni Batavorum, | Apud Conradum Wishoff, 1738. 8°. ll. 10. Pars i, ll. 2, pp. 1–66, ll. 2. Pars ii, ll. 2, pp. 1–92. Pars iii, ll. 4, pp. 1–84, ll. 2. Pars iv, ll. 2, pp. 1–118, ll. 11. Pars v, l. 1, pp. 1–102 (*i. e.*, 112), ll. 2.

[Pars Prima.] Petri Artedi | Angermannia-Sveci | Bibliotheca | Ichthyologia | seu | Historia litteraria Ichthyologiæ | in qua | Recensio fit Auctorum, qui de Piscibus | scripsere, librorum titulis, loco & editionis | tempore, additis judiciis, quid Quivis | Auctor præstiterit, quali metho- | do & successu scripserit, | disposita secundum | Secula | in quibus quisquis author floruit. | Ichthyologiæ Pars I. | — | Lugduni Batavorum, | Apud Conradum Wishoff, 1738. ll. 2, pp. 1–66, ll. 2.

[Pars Secunda.] Petri Artedi | Sveci | Philosophia | Ichthyologica | in qua quidquid fundamenta artis | absolvit: Characteribus scilicet genericorum, Differentiarum | Specificarum, Varietatum et No- | minum Theoria rationibus de- | monstratur, et Exemplis | comprobatur. | Ichthyologiæ Pars II. [Viguette.] Lugduni Batavorum | Apud Conradum Wishoff, 1738. ll. 2, pp. 1–92.

Pisces Cetacei, *passim*.

[Pars Tertia.] Petri Artedi | Sueci | Genera | Piscium. | In quibus | Systema totum Ichthyologiæ proponitur | cum | Classibus, Ordinibus, | Generum Characteribus, | Specierum differentiis, | Observationibus plurimis. | redactis | Speciebus 242 ad Genera 52. | Ichthyologiæ Pars III. | — | Lugduni Batavorum, | Apud Conradum Wishoff, 1738. 8°. ll. 4, pp. 1–84, ll. 2.

Ordo v. Plagiuri, pp. 74–81. [Gen.] xlii [lege xlvi]. *Physeter* (p. 74), cum spp. 2 [= *Physeter macrocephalus*]. xlvii. Delphinus (p. 75), cum spp. 3 [= **1.** *Phocæna communis*; **2.** *Delphinus delphis*; **3.** *Orca* sp.]. xlviii. *Balæna* (p. 76), cum spp. 4 [= **1.** *Balæna mysticetus*; **2.** *Physalus antiquorum?* **3.** *Balænoptera rostrata?* **4.** *Physalus antiquorum?*] xlix. *Monodon* (p. 78), cum 1 sp. [= *Monodon monoceros*]. l. *Catodon* (p. 78), cum spp. 2 [= **1.** *? Beluga catodon*; **2.** *Physeter macrocephalus*]. li. *Thrichechus* [vel *Trichechus*] (p. 79), cum sp. 1 [= genn. *Manatus* et *Halicore*]. lii. *Siren* (p. 81), cum 1 sp. [= sp. fab.].

[Pars Quatuor.] Petri Artedi | Angermannia-Sveci | Synonymia | Nominum Piscium | fere omnium; | in qua recensio fit | nominum Piscium, omnium facile Au- | thorum, qui umquam de Piscibus scri- | psere: Uti Græcorum, Romanorum, | Barbarorum, nec non omnium in- | sequentium Ichthyologorum, | una cum Nominibus inquili- | nis variarum Nationum. | — Opus sine pari. | Ichthyologiæ Pars IV. | [Vignette.] Lugduni Batavorum, | Apud Conradum Wishoff, 1738. ll. 2, pp. 1–118, ll. 11.

Ordo v. Plagiuri, pp. 104–108.

[Pars quinque.] Petri Artedi | Sveci | Descriptiones | Specierum Piscium | Quos vivos præsertim dissecuit et | examinavit, inter quos primario | Pisces | Regni Sueciæ | facile omnes | accuratissime describuntur | cum non paucis

1738. **Artedi, P.**—Continued.
aliis | exoticis. | Ichthyologiæ Pars V. | [Vignette.] Lugduni Batavorum, | Apud Conradum Wishoff, 1738. 8°. l. i, pp. 1–102 (*i. e.*, 112), ll. 2.

Ordo v. Plagiuri, Balæna, G. Pisc. 48, pp. 106–107. [209.]

1738. **Egede, Hans.** Omstændelig og udførlig | Relation, | Angaaende | den Grønlandske Missions | Begyndelse og Fortsættelse, | samt | hvad ellers mere der ved Landets Recognoscering, | dets Beskaffevhed, og Indbyggernes Væsen og | Leve-Maade vedkommende, er befunden; | Af | Hans Egede, | Først Guds Ords u-værdig Lærere for Bogens Menigheder | udi Nord-Landene dereſter Kongelig Dansk | Missionair udi Grønland. | [Vignette.] | Kjöbenhaven. 1738. | Trykt hos Joh. Christ. Groth, boende paa Graabrødre-Torv. 4°. ll. 10, pp. 1–408.

Contains passing references to Whalefishing by the Greenlanders. There is a German translation, Hamburg, 1740, 4°. [210.]

1738. **Hampe, John Henry.** A Description of the same *Narhual*, communicated by *John Henry Hampe*, M. D. F. R. S. <*Phil. Trans.*, *Lond.*, xl, no. 447, 1738, pp. 149–150.

A further and rather more explicit account of the external characters of the specimen referred to below (see next title). [211.]

1738. **Steigertahl,** *Dr.* Part of a Letter from Dr. *Steigertahl*, F. R. S., to Sir *Hans Sloane*, Bart. Pres. R. S., giving an Account of a *Narhual* or *Unicorn Fish*, lately taken in the River *Ost*, Dutchy of *Bremen*, dated at *Hanover* $\frac{\text{May 1}}{\text{April 20}}$ 1736. Translated from the *French* by *T. S.* M. D., &c. <*Philos. Trans.*, *Lond.*, xl, no. 447, 1738, pp. 147–149, pl. i, fig. 1.

Monodon monoceros; account of capture and external appearance of a specimen taken January, 1735, in the river Ost, Bremen. Pl. i, fig. 1, animal, from "the Figure engrav'd and printed at Hamburg." [212.]

1739–1804. **Wagenaar, J.,** *and others.* "Staat (Tegenwoordige) der Vereenigde Nederlanden (door J. Wagenaar e. a.). Amsterdam, Tirion, 1739–1804. 23 dln. gr. 8°. Met platen en kaarten."

". . . Walvischvangst, door de West-Indische maatschappij zonder voordeel ondernomen, i, bl. 533. Beginsels der walvischvangst, bl. 588. Wetten omtrent dezelve, bl. 592. Waar zij geschiede, bl. 593. Onderzoek of er de reeders voordeel bij hebben, bl. 599. Kosten op de uitrusting, enz., bl. 501, 506. Walvischbaarden, bl. 597, 599, 608. Walvischspek, hoé dik, bl. 598."

Not seen; title and references from Bosgoed, *op. cit.*, p. 210, no. 3170. [213.]

1740. **Frisch, Johann Leonhard.** De Phocæna in Pomeraniæ lacu quodam inventa. <*Miscel. Berolinensia*, vi, 1740, p. 124, pl. vi.

Phocæna communis. 1 page of text and fig. of animal. [214.]

1740. **Herrara, A. de.** The General | History | of the vast | Continent and Islands | of | America, | Commonly call'd, The | West-Indies, | from | The First discovery thereof: | With the best Accounts the People could give of their | Antiquities. | Collected from the Original Relations | sent to the Kings of Spain. | — | By Antonio de Herrara, | Historiographer to His Catholick Majesty. | — | Translated into English by Capt. John Stevens. | — | Vol. I[–VI]. | — | Illustrated with Cuts and Maps. | — | The Second Edition. | — | London, | Printed for Wood and Woodward in Paternoster-Row. | MDCCXL. 6 vols. 8°.

The Manati, vol. i, p. 278. For additional comment, see edd. of 1728. [215.]

1740. **Klein, J. T.** Iacobi | Theodori Klein | Historiæ | Piscium | Naturalis | Promovendæ | Missus primus | de | Lapillis eorumqve Numero | in | Craniis Piscium, | cum Praefatione: | de | Piscium auditu. | Accesserunt | I. Anatome Tursionum | II. Observata in Capite Raiæ. | — | Virgil. V. Æneid. 239. | Dixit: eumque imis sub fluctibus audiit omnis Nereidum Phorcique Chorus. | Cum Figuris. | [Vignette.] | — | Gedani, Litteris Schreiberianis. 1740. 4°. l. 1, pp. 1–35.

1740. KLEIN, J. T.—Continued.

i. Anatome Phocænæ, auctore Dn. de la Motte; Gedanensi, M. D., pp. 24–28. Additiones [auctore J. T. Klein], pp. 28–32, tab. iv [*i. e.*, v], figg. A, B, cranium; fig. C, penis; fig. D, ductus thorac.; figg. 1–4, 7–9, ossa aud.; fig. 5, vermiculi; fig. 6, lobi et nervi olfact. [216.]

1741. EGEDE, H. Det gamle | Grønlands | Nye | Perlustration, | Eller | Naturel Historie, | Og | Beskrivelse over det gamle Grønlands Situation, | Luft, Temperament og Beskaffenhed; | De gamle Noorske Coloniers Begyndelse og Undergang der | Samme-Steds, de itzige Indbyggeres Oprindelse, Væsen, | Leve-Maade og Handtæringer, samt Hvad ellers Landet | Yder og giver af sig saasom Dyer, Fiske og Fugle &c. med | hosføyet nyt Land-Caart og andre Kaaber-Stykker | over Landets Naturalier og Indbyggernis | Handtæringer, | Forfattet af | Hans Egede, | Forhen Missionair udi Grønland. | — | Kjøbenhavn, 1741. | Trykt hos Johan Christoph Groth, hvende paa Ulfelds-platz. 1 vol. sm. 4°. 6 ll., pp. 1–131, l. 1, map, and pll. 11.

Cap. vi. Hvad Slags Diur, Fiske og Fugle den Grønlandske, See giver af sig etc., pp. 36–55, pll. facing pp. 37 and 42.

Finnefisk, p. 36, fig. pl. facing p. 37. Hvalvisk [*Balæna mysticetus*], pp. 36–40, fig. pl. facing p. 37. Nordkapper, p. 40. Sverdfisk [*Orca*], p. 40, fig. pl. facing p. 37. Cacheloter, p. 41. Hviid-Fisk, p. 41, fig. pl. facing p. 42. Buts Kopper, pp. 41, 42. Enhiørning, pp. 42–44, figg. of animal, three views of skull, and of detached horns. Marsvin, p. 45.

Cap. vii. Om Grønlændernes Handtærenger, Nærings Brug og Redskab, saa vel som Boerkab, pp. 56–62, pll. facing, pp. 57, 59. Page 57 describes how the Greenlanders kill Whales, and the plate facing the same page is a Whaling scene.

"Egede's work is still one of the best existing on Greenland, and claims most of all the title of truthfulness, the author having been no less than 15 years in that country."

The present is the *editio princeps*, of which there are numerous subsequent ones in various languages.

A German translation appeared at Copenhagen in 1742 (*q. v.*); an English in 1745 (*q. v.*); a Dutch in 1746 (Delft); a French in 1763 (Geneva and Copenhagen); a German in 1763 (*q. v.*), and in 1769 (Berlin); and probably, also, others, besides various abridgments to be found in collections of voyages. [217.]

1741. KLEIN, J. T. Iacobi Theodori Klein | Historiæ | Piscium | Naturalis | promovendæ | Missus Secundus | de | Piscibus per Pulmones | spirantibus | ad iustum numerum et ordinem | redigendis. | Accesserunt singularia: | de | I. Dentibus Balænarum et Elephantinis. | II. Lapide Manati et Tiburonis. | — | Horatius: | Delphinum sylvis appingit, fluctibus Aprum, qvi variare cupit rem | prodigialiter unam. | Cum Figuris. | [Vignette.] — | Gedani, Litteris Schreiberianis. 1741. 4°. ll. 3, pp. 1–38, l. 1.

De Piscibus, per Pulmones spirantibus . . . [etc.], pp. 1–27, tabb. i–iii. i. De Dentibus Balænarum et Elephantinis, pp. 28–32, tab. iv, figg. 1–4 (teeth of *Physeter*). ii. De Lapide Manati et Tiburonis, pp. 33–38, tab. iv, figg. 5–7 (ossa petrosa Manati).

Horum Synoptica Tabula [p. 9]:

- PHYSETERES
  - I. BALÆNÆ
    - I. Edentulæ
      - 1. In Dorso lævi apinnes.
      - 2. In Dorso gibbo apinnes.
      - 3. In Dorso pinnatæ.
    - II. Dentatæ
      - 1. Dorso lævi apinnes.
      - 2. Dorso lævi pinnatæ.
      - 3. Dorso gibbo apinnes.
      - 4. Dorso gibbo pinnatæ.
  - II. NARWHAL s. Monodon.
  - III. DELPHACES s. Porcelli
    - 1. Capite in rostrum porcinum, simum, exeunte: *Orca*;
    - 2. Capite in rostrum porcinum rectum & longum protenso: *Delphinus*.
    - 3. Rostro recto, brevi, & obtuso: *Tursio* s. *Phocæna*.

BALÆNÆ EDENTULÆ [=*Mysticete*, auct. mod.] *In Dorso lævi apinnes.* **1.** Balæna vera Zorgdrageri, p. 11 [=*B. mysticetus*]; **2.** Balæna albicans; Weisfisch Martensii & Zorgdr. [=*Beluga catodon*]; **3.** Balæna glacialis = Eisfisch, Zud-Eisfisch, West-Eisfisch, Nordkapper, Zorgdr. [= *B. mysticetus*, part.]. *In Dorso gibbo apinnes.* **1.** Gibbo unico propo caudam [= "Bunch or Hump-back Whale" of Dudley, hence *Balæna gibbosa* auct. var., nec. Erxleben] **2.** Balæna macra [= "Scrag Whale" of Dudley]. *In Dorso pinnatæ.* **1.** Ore Balænæ vulgaris, *a*, Balæna edentula, corpore strictiore, dorso pinnato Raji; *b*, *jubartes* [= ? *Physalus antiquorum*]; **2.** Ore rostrato [=*Hyperoodon bidens*].

1741. **Klein, J. T.**—Continued.

Balænæ Dentatæ. *Dorso lævi apinnes.* **1.** Cete Clusii [=*Physeter macrocephalus*]. **2.** Cachelot s. Potfish Zorgdrageri [=*Physeter macrocephalus*]. *Dorso lævi pinnatæ.* **1.** Balæna major . . . Sibbaldi [=? *Physeter macrocephalus*]; **3.** Mular Nierembergii [=*Physeter macrocephalus*]; **3.** Linckii [=?]. *Dorso gibbo apinnis.* **1.** Dudleji Balæna [="Sperma Ceti Whale" of Dudley, hence *Physeter macrocephalus*]. *Dorso gibbo pinnata.* Balæna, Tigridis instar, variegata [=? sp. fict.].

Narwhal. Monodon Artedi, etc., p. 18, tab. ii, C, anim. [=*Monodon monoceros*].

Delphaces s. Porcelli. **1.** *Orca* itaqve est, qvæ Sibbaldo dicitur Balæna minor in utraqve mandibula dentata, p. 23, tab. i, no. i, cranium; **2.** *Delphinus*, p. 24, tab. i, no. ii, cranium, tab. iii, A, anim. [=*Delphinus delphis*]; **3.** Tursio sive Phocæna, p. 26, tab. i, no. iii: cranium, tab. ii, A, B, fœtus, tab. iii, lit. B, anim. ad. [=*Phocæna communis*]. [218.]

1741. **Kühn, Johann Michael.** "Merkwürdige Lebens- und Reisebeschreibung, dessen Schiffahrten nach Grönland und Spitsbergen. Gotha, 1741. 8°.

"Zie aldaar o. a.: Erste (und zwote) auf einem hamburgischen Schiffe nach Spitsbergen gethane Reise, 1720–22. Adelung geeft in zijn: 'Geschichte der Schiffahrten' van beide reizen een uittreksel. bl. 429–438."

Not seen; from Bosgoed, *op. cit.*, p. 240, no. 3496. See 1768. **Adelung, J. C.** [219.]

1742. **Egede, H.** Des alten | Grönlandes | Neue | Perlustration, | Oder | Naturell-Historie | Und | Beschreibung | Der Situation, Beschaffenheit, Lufft und des Temperaments | dieses Landes; | Wie auch | Vom Anfange und Untergange derer alten Nor- | wegischen Colonien daselbst; vom Ursprunge, der Sitten Le- | bensart und den Gebräuchen derer jtzigen Einwohner, und was | Dieses Land an Thieren, Fischen, Vögeln, etc. heget und mittheilet; Deme beygefüget | Eine neue Land Charte und andere in Kupfer gestochene Figu- | ren und Abbildungen der Naturalien und Handthierungen | derer dasigen Einwohner; | Verfasset und beschrieben | von | Hans Egede, | Vormaliger Missionair in Grönland, | — | Aus den Dänischen ins Teutsche übersetzt. | — | Copenhagen, gedruckt bey Johann Christoph Grothen, 1742. sm. 4°. ll. 6, pp. 1–144, pll. 11, map.

This edition appeared almost simultaneously with the original Danish, and was issued at Copenhagen by the same publisher. The plates are from the original etchings, not even the page references being changed, they still referring to the Danish edition instead of the present one. In this edition chap. vi occupies pp. 44–66, and the account of how the Greenlanders kill whales occurs at p. 68. For fuller annotation see **Egede**, at 1741. [220.]

1742. **Labat, R. P.** Nouveau | Voyage | aux Isles | de l'Amerique, | contenant | l'Histoire Naturelle de ces pays, | l'Origine, les Mœurs, la Religion & le Gou- | vernement des Habitans anciens & modernes. | Les Guerres & les Evenemens singuliers qui y sont | arrivez pendant le séjour que l'Auteur y a fait. | Par le R. P. Labat, de l'Ordre | des Freres Prêcheurs. | Nouvelle Edition augmentée considérablement, & en- | richie de Figures en Tailles-douces. | Tome premier [-huitieme]. | [Design.] A Paris, Rue S. Jacques, | Chez Ch. J. B. Delespine, Imp. Lib. ord. du | Roy, à la Victoire & au Palmier. | — | M.DCC.XLII. | Avec Approbation & Privilege du Roy. 8 vols. 12°.

Description d'un poisson appellé Lamantin ou Manati, vol. ii, pp. 256–263, pl. fac. p. 256. For comment see edition of 1722. [221.]

1744. **Charlevoix, P. F. X. de.** Histoire | et | Description generale | de la | Nouvelle France, | avec | le Journal historique | d'un Voyage fait par ordre du Roi dans | l'Amerique Septentrionnale. | Par le P. [Pierre-François Xavier] de Charlevoix, de la Compagnie de Jesus. | Tome premier[-troisième].—[Vignette.] A Paris, Chez la Veuve Ganeau, Libraire, rue S. Jacques, près la rue | du Plâtre, aux Armes de Dombes. | — | M. DCC. XLII. | Avec Approbation et Privilege du Roi. 3 vols. 4°. Vol. i, ll. 4, pp. i–lxj, ll. 1½, pp. ix–xxvj, 1–644, 9 maps. Vol. ii, ll. 2, pp. i–xvj, 1–582, 1–56, 8 maps, 22 pll. (of plants). Vol. iii, ll. 2, pp. i–xix, *i–xiv*, 1–543, 10 maps.

The "Histoire," etc., comprises the first two volumes only, the title changing with the third to the following:

Journal | d'un | Voyage | fait par ordre du Roi | dans | l'Amerique septentrionnale; | Adressé à Madame la Duchesse | De Lesdiguieres. | Par le P. de Charlevoix, de la Compagnie de Jesus. | [etc. as above.]

1744. Charlevoix, P. F. X. de.—Continued.

In the "Huitième Lettre" occurs important cetological matter, as follows: De la Pêche du Loup Marin, de la Vache Marine, du Marsouin, & des Baleines, pp. 143–149 (Marsouins, pp. 147–149; Baleines, p. 149). The account relates mostly to the "Marsouin blanc" [*Beluga catodon*] and its capture, from which it appears that there were two points, a few miles below Quebec, in the Saint Lawrence River, at which these animals were then taken in considerable numbers. A few Whales were still caught at the mouth of the Bay of Saint Lawrence.

Two editions of this work were issued at Paris, by different publishers, in the year 1744, one in 3 vols., 4°, of which the title and collation are above given; the other in 6 vols., 12°, both with the same titles, differing only in the breaking of the lines and in the publisher's imprint. The collation of the 12° ed. here follows: [222.]

1744. Charlevoix, P. F. X. de. Histoire | et | Description generale | de la | Nouvelle France, | avec | le Journal historique | d'un Voyage fait par ordre du Roi | dans l'Amerique sepentrionnale. | Par le P. [Pierre François Xavier] de Charlevoix, de la Compagnie | de Jesus. | Tome premier[-sixième]. | [Design.] A Paris, | Chez Pierre-François Giffart | rue Saint Jacques, à Sainte Therese. | — | M DCC XLIV. | Avec Approbation & Privilege du Roi. 6 vols. 12°. Vol. i, ll. 3, pp. i–viii, 1–454, 6 maps. Vol. ii, l. 1, pp. 1–501, 3 maps. Vol. iii, l. 1, pp. 1–465, 2 maps. Vol. iv, l. 1, pp. 1–388, pll. 22, 6 maps. Vol. v, l. 1, pp. i–xxviij, 1–456, 7 maps. Vol. vi, l. 1, pp. 1–434, ll. 2, 3 maps.

In this edition the title changes with the fifth volume, the title of vols. v and vi of this edition being the same as that of vol. iii of the 4° ed., save, of course, the publisher's imprint.

The cetological matter is the same (as is the text in general) as that of the 4° ed. (*q. v.*), and occurs in vol. v, pp. 217–220.

Of the "Journal d'un Voyage," etc., there are two early English versions, each in 1 vol., 8° (London, 1761 and 1763, *q. v.*). There is a recent English translation of the "Histoire" by Dr. J. G. Shea (8 vols., roy. 8°, New York, 1865), but this does not include the "Voyage," and consequently not the cetological matter. [223.]

1744. [Despelette, —]. Cachalot échoué près de Baïonne. <*Hist. de l'Acad. roy. des Sci. de Paris*, ann. 1741 (1744), pp. 26–28.

This is perhaps *editorial*, based on a communication from M. Despelette. [224.]

1744. [Doorgeest, E. Az. van.] "Kort Verhael van eenige merkwaerdige geschiedenissen van Holland [door E. Az. van Doorgeest]. Amsterdam, K. de Wit, 1744. 8°."

Beschrijving van de haringvisscherij en walvischvangst, pp. 78–96.

Not seen; title and reference from Bosgoed, *op. cit.*, p. 249, no. 3577. Said to be a short extract from "Den Rijper Zee-postil," etc., 1669, Doorgeest and Posjager. [225.]

1744. Green, J. Abstract of a *Natural History* of *Greenland*, by *Hans Egedius*, intituled, *Det gamle Gronlands Perlustration, eller Naturel-Historie, af* Hans Egede, *Kiobenhabn*, 1741. 4°. Communicated by *John Green*, M. D., Secretary of the *Gentlemans Society*, at *Spalding*. <*Philos. Trans. Lond.*, xlii, no. 471, 1744, pp. 607–615.

Chapter vi enumerates the Cetacea, Fish, and Birds common to Greenland. [226.]

1744. Oexmelin, A. O. [=Exquemelin, A. O.] Histoire | des | Avanturiers | Flibustiers | Qui se sont signalez dans les Indes. | Contenant | ce qu'ils y ont fait de remarquable, | avec | La Vie, les Mœurs & les Coutumes des Boucaniers, | & des Habitans de S. Domingue & de la Tortue; | Une Description exacte de ces lieux; Et un Etat | des Offices tant Ecclésiastiques que Séculieres, | & ce que les plus grands Princes de l'Europe y | Possèdent. | Le tout enrichi de Cartes Géographiques & de Figures | en Taille-douce. | Par Alexander-Olivier Oexmelin. | Nouvelle Edition Corrigée | & Augmentée de l'Histoire des Pirates | Anglois depuis leur Etablissement dans | l'Isle de la Providence jusqu'à présent. | Tome Premier[-Quatrième.] | [Design.] A Trevoux, | Par la Compagnie. | — | M. DCC. XLIV. 4 vols. 12°. Vol. i, ll. 7 (incl. eng. and plain title), pp. 1–394, l. 1, map and plates.

Histoire des Animaux et des Plantes qui sont sur les Isles de la Tortuë & de Saint Domingue, vol. i, pp. 315–383. Chap. vi, Des Reptiles de l'Isle de St. Domingue, pp. 359–383, pl. fac. p. 373. Anatomie du Lamentin, pp. 372–376 (nearly 4 pp.), avec fig. du Lamentin. This is an original account (at least written in the first person and evidently from observa-

1744. OEXMELIN, A. O.—Continued.

tion) of the external characters and internal structure of the Manatee, its habits, capture, etc., with an (apparently) original figure. The figure, like Labat's, represents an old Manatee with a young one in her arms; the figure is more artistic than Labat's, and has the head of the young one directed forward instead of backward.

The first French edition, said to be of "extreme rarity," and a translation from the English, was published at Paris in 1686, 2 vols., 12°. This I have not seen, and therefore cannot say wherein the matter relating to the Manatee differs from that of the present "corrected and enlarged" edition. This is the first edition of the Buccaneers I have seen which contains a figure of the Manatee. The matter in this edition is almost entirely different throughout from that of the Spanish, Dutch, and English editions (see *antecà*, 1678. EXQUEMELIN, A. O.), and covers many points relating to the Manatee not mentioned in those. This is doubtless explained by the following transcript from the translator's preface of the present edition: "La Relation qu'il a écrite de ce que la nature produit dans les Isles de Saint Domingue & de la Tortuë se trouve à la fin du premier Tome, on a choisi cet ordre pour ne pas interrompre le fil de l'Histoire des Flibustiers: on l'a même augmentée sur de nouveaux Mémoires contenant la Relation du naufrage de Monsieur d'Ogeron a Puerto Ricco, l'Histoire du Capitaine Montauban; les Expeditions de Campêche, de la Vera Cruz, de Cartagéne, & les courses de plusieurs Capitaines Flibusters, dont la valeur est présentement aussi connue en Europe qu'elle est estimée dans les Indes." The plate illustrating the chapter vi here cited represents (upper half) the "Manière de Pêcher la Tortuë." Below this is the figure of "le Lamantin," and at the bottom of the plate three different forms of harpoon used in capturing Turtles and Lamantines.

The engraved title of this edition is dated 1743. The following is a transcript:

Histoire | des | Avanturiers | des | Boucaniers | et | de la Chambre | des Comptes, | établie | dans les | Indes | 1743.

Respecting the various translations and editions of Oexmelin [=Exquemelin; also written Esquemeling], see Sabin, *Bibl. Amer.*, vi, pp. 309–318, 328, nos. 23468–23494; also, *suprà*, 1678. EXQUEMELIN, A. O. [227.]

1744. "ROEDE, —. Diss. de pisce qui Ionam deglutivit, cuiusnam speciei fuerit. Hafn. 1744. 4°."

Not seen; title from Donndorff, *Zool. Beytr.*, i, 1792, p. 776. [228.]

1744. "WIJBO, J. CANZIUS. Dissertatio de balaenarum piscatu. Lugd. Bat., 1774. 4°."

Not seen; from Bosgoed, *op. cit.*, p. 253, no. 3009. [229.]

1745. "EGEDE, H. A | Description | of | Greenland. | Shewing | The Natural History, Situation, Boundaries, | and face of the Country; the Nature of the | Soil; the Rise and Progress of the old Nor- | wegian Colonies; the ancient and modern | Inhabitants; their Genius and Way of Life, | and Produce of the Soil; their Plants, Beasts, | Fishes, &c. | with | A new Map of Greenland. | And | Several Copper Plates representing different Animals, | Birds and Fishes, the Greenlanders Way of Hunting | and Fishing; their Habitations, Dress, Sports | and diversions, &c. | — | By Mr. Hans Egede, | Missionary in that Country for twenty-five Years. | — | Translated from the Danish. | — | London: | Printed for C. Hitch in Paternoster Row; S. Austen in | Newgate-Street; and J. Jackson near St. James's Gate. | MDCCXLV. 1 vol. sm. 8°. pp. xvi+2 ll., 220, with 12 copperpll."

"Chap. vi, pp. 65–99, 'Of the Greenland Sea Animals, and Sea Fowl and Fishes.'"

Not seen; title from Coues, *Birds Colorado Valley*, 1878, p. 578. [230.]

1745. GUMILLA, J. El Orinoco | Ilustrado, y Defendido, | Historia Natural, | Civil, y Geographica | De este Gran Rio, | y de sus caudolosas vertientes: | Govierno, Usos, y Costumbres de los Indios | sus habitadotes, con neuvas, y utiles noticias de Animales, Arboles, | Fiutos Aceytes, Refinas, Yervas, y Raices medicinales; y sobrestodo, se hallaràn convetsiones muy singulares à N. Santa Fé, | y casos de mucha edificacion. | Escrita | Por el Padre Joseph Gumilla, de la Comañia de Jesus | . . . [=titles, 6 lines] | Segunda Impression, Revista y Augmentada | por su mismo Autor, y dividida en dos Partes. | Tomo [Seal] Primero | — | En Madrid: Por Manuel Fernandez, Impressor de el Supremo |

1745. **Gumilla, J.**—Continued.
Consejo de la Inquisicion, y de la Reverenda Camara Apostolica, | en la Caba Baxa. Año M. DCC. XLV. 2 vols., 4°. ll. 24, pp. 1–403, ll. 2, map, and pll.

Variedad de Peces, y singulares industrias de los Indios para pescar: Piedras, y buessos medicinales, que se han descubierto en algunos pescados, tom. i, cap. xxi, pp. 314–330.—Manati, pp. 319–327. Account of the abundance of these animals in the Orinoco and its tributary waters, the manner of their capture by the Indians, their habits and external appearance, and the wonderful medicinal properties of their ear bones.

First edition, not seen; there is a later Spanish edition published in 1791 (*q. v.*); also a French edition (1758, *q. v.*), and doubtless others. [231.]

1745. **Smith, [W.]** A | Natural History | of | Nevis, | And the rest of the English Leeward Charibee Islands | in | America. | With many other Observations on | Nature and Art; | Particularly, An Introduction to | The Art of Decyphering. | In | Eleven Letters from the Rev^{d}. Mr. [William] Smith, | sometime Rector of St. John's at Nevis, and | now Rector of St. Mary's in Bedford; to the | Rev^{d} Mr. Mason, B. D. Woodwardian | Professor, and Fellow of Trinity-College, in Cambridge. | — | Cambridge: | Printed by J. Bentham, Printer to the University; | . . . [= names of four booksellers.] | MDCCXLV. 8°. ll. 3, pp. 1–318, ll. 5.

Natural history, *passim*. Account of "Millions of Porpusses" seen near the "Leeward Charibbee Islands," pp. 185, 186; two species, one of them "with Noses in the exact form, and full as big as Quart Glass-bottles, on which account they have justly acquired the name of Bottle-noses." Account of a fight between the "Grampus" and the "Sword-Fish and Thrasher as Allies," pp. 198, 199. Also account of a Baleen Whale, 35 feet long, stranded at Burgh, Lincolnshire, pp. 199–201. [232.]

1746. "**Anderson, J.** Herrn Johann Anderson, | I. V. D. | und weyland ersten Burgermeisters der freyen Kayserlichen | Reichstadt Hamburg, | Nachrichten | von Island, | Grönland und der Strasse Davis, | zum wahren Nutzen der Wissenschaften | und der Handlung. | Mit Kupfern, und einer nach den neuesten und in diesem Werke ange- | gedenen Entdeckungen, genau eingerichteten Landcharte. | Nebst einem Vorberichte | von den Lebensumständen des Herrn Verfassers. | [Vignette.] | Hamburg, | verlegts Georg Christian Grund, Buchdr. 1746. 1 vol. sm. 8vo, 8 leaves to a sig. Vignette facing title, title, reverse blank, 14 unpaged ll. ('Vorrede' and 'Vorbericht'), pp. 1–328, 3 unpaged ll. ('Register'); map, and 4 pll., at pp. 43."

". . . There are numerous editions; besides the three I here give (see 1750 and 1756), there are these: German, Frankfurt u. Leipzig, 1747; Danish, Copenhagen, 1748; English, London, 1758, folio; and two or three French versions of later dates than 1750.—*See* Cuv., *R. A.*, iii, 331; Böhm., *Bibl.*, i, 769; Ag. & Strickl., *Bibl.*, i, 127."

Not seen; title and comment from Coues, *Birds Col. Vall.*, App., 1878, p. 579.

Anderson's work, from its early date and the detailed information it gives, is one of importance in its relation to Cetology. See later editions, especially the Dutch versions of 1750 and 1756.

Strange as it may seem, I have been unable to find any edition of Anderson in any of the principal libraries of Cambridge and Boston, the collations here given being all at second hand. [233.]

1746. **Anon.?** "Lijst (Naauwkeurige) van Nederlandsche schepen die sedert 1661 naar Groenland, en sedert 1719 tot op dezen tegenwoordigen tijd naar de straat Davis zijn uitgevaren. Amsterdam, C. van Tongerloo. 1746. kl. 8°. Een vervolg op deze lijst vindt men bij: *Honig.*"

"In Fr. Muller's Catalogue of books on America, wordt onder No. 1781 een Hollandsch MS. vermeld, bevattende aanteekeningen van de schepen, in de jaren 1753–1773 naar Groenland en de straat Davids, ter walvischvangst vertrokken; en onder No. 1782 eene Lijst in welcke jaaren de meeste en weinigste visschen uit Groenland en de straat Davids zijn aangebragt (1669–1792). 1 vol. folio. No. 663: Lijst van de Hollandsche en Hamburger Groenlands- en Straat Davids vaarders Ao 1764 uitgevaaren. Amst., J. M. Brouwer. 1765. 8°."

Not seen; title and note from Bosgoed, *op. cit.*, pp. 241, 242, no. 3505. *See, also*, 1807. Honig, J. [234.]

1746. "**Egede, Hans.** Beschrijving van Oud-Groenland, of eigentlijk van de zoogenaamde Straat Davis; behelzende deszelfs natuurlijke historie, stands gele-

1746. "EGEDE, HANS.—Continued.
genheid, gedaante, grensscheidingen, veld-gewassen, dieren, vogelen, visschen, enz. Mitsgaders den oorsprong en voortgang der aeloude Noorweegsche volkplantingen in dat gewest; benevens den aart, inborst, woonigen, levenswijze, kleding, enz. der hedendaagsche inboorlingen. Eerst in de Deensche taal beschreven door Mr. Hans Egede, en nu in 't Nederduitsch overgebragt. Met een nieuwe kaart van dat landschap en (10) aardige printverbeeldingen versiert. Te Delft, bij R. Boitet, 1746. 4°."

"Zie aldaar: Van de zee-dieren, zee-vogels en visschen, walvisschen, enz., bl. 54-67 . . . Van de gewone bezigheden als jagen en visschen en de noodige gereedschappen daartoe, bl. 84-94."

Not seen; title and references from Bosgoed, *op. cit.*, p. 235, no. 3451. For reference to the matter relating to Cetaceans, see the original Danish edition of 1741. [235.]

1746. LINNÉ, C. Caroli Linnæi | . . . [=titles, 2 lines] | Fauna | Svecica | Sistens | Animalia Sveciæ Regni: | Qvadrupedia, Aves, Amphibia, | Pisces, Insecta, Vermes, | Distributa | Per | Classes & Ordines, | Genera & Species. | Cum | Differentiis Specierum, | Synonymis Auctorum, | Nominibus Incolarum, | Locis Habitationum, | Descriptionibus Insectorum. | — | Stockholmiæ | Sumtu & literis Laurentii Salvii | 1746. 8°. 14 ll., pp. 1-411, pll. i, ii.

Classis iv. Pisces. I. Plagiuri =Cetacea, pp. 98-100, 4 genn., 6 spp., to wit: **1.** *Catodon* fistula in cervice, p. 98 = *Physeter macrocephalus*; **2.** Monodon, p. 98; **3.** *Balæna* fistula in medio capite, dorso caudam versus acuminato, p. 98; **4.** *Balæna* fistula in medio capite, tubero pinniformi in extremo dorso, p. 99; **5.** *Delphinus* corpore subconiformi, dorso lato, rostro subacuto, p. 99; **6.** *Delphinus* rostro sursum repando, dentibus latis serratis, p. 100. [236.]

1747. BROWNE, J., *and others, or* EDITOR. An Account of the Experiments relating to Ambergris, made by Mr. *John Browne*, and Mr. *Ambrose Godfrey Hauckwitz*, FF. R. S., with Mr. *Newman's* Vindication of his Experiment, drawn up by *C. Mortimer*, R. S. Secr. <*Philos. Trans., Abridged by Martyn*, 1732-44, ix, pt. 3, 1747, pp. 366-368.

From *Philos. Trans. Lond.*, no. 435, p. 437. *See* 1735. EDITOR. [237.]

1747. HAMPE, J. H. A Description of the same *Narhual* [as forms the subject of Dr. Steigertahl's communication]. <*Philos. Trans., Abridged by Martyn*, 1732-44, 44, ix, pt. 3, 1747, p. 72.

From *Philos. Trans. Lond.*, no. 447, p. 149. *See* 1738. HAMPE. [238.]

1747. NEUMAN, C. Of Ambergris . . . <*Phil. Trans., Abridged by Martyn*, 1732-44, ix, pt. 3, 1747, pp. 339-346, 346-358, 358-366.

From *Philos. Trans. Lond.*, no. 443, p. 344; no. 434, p. 371; no. 435, p. 417. *See* 1738. NEUMANN. [239.]

1747. [PRÉVOST, A. F.] Sierra-Leona, par Atkins. <*Hist. génér. des Voy., du Prévost*, iii, 1747, pp. 239-252.

Manatée ou Vache marine, pp. 240-241. External characters and mode of capture, based on Atkins, *Voy. en Guinée*, etc., p. 43. (*See* ATKINS, under 1735.)

La Vache de mer ou le Lamantin, *ibid.*, pp. 315-316. A compiled account, based largely on Atkins, *op. cit.*

Poisson de mer & de rivieres [de la Côte d'Or], *ibid.*, iv, pp. 256-262. Le Grampus ou le Souffleur, pp. 259, 260. Le Marsouin, p. 260.

Poisson de mer & d'eau douce [de Congo & d'Angola], *ibid.*, v, 1748, pp. 91-95. L'Ambize Angulo, pp. 92-93. Account of external characters, etc., compiled from Dapper. [240.]

1747. SCILLA, AUGUSTINO. De | Corporibus Marinis | Lapidescentibus | quæ defossa reperiuntur, | Auctore Augustino Scilla | addita dissertatione | Fabii Columnæ | de Glossopetris. | [Vignette.] Romæ, Typis Antonii de Rubeis in via Seminarii Romani. | MDCCXLVII. | — | Superiorum permissu. 4°. ll. 5, pp. 1-73, ll. 3, pll. i-xxviii+frontispiece.

In this first Latin version of Scilla (*see* 1670. SCILLA) the description of Squalodont remains occurs at p. 47. The plates are the same as those of the original edition, the Squalodont remains being represented in fig. 1, pl. xii. [241.]

1747. **Steigertahl**, [J. G.] Account of a *Narhual* or *Unicorn Fish*, by Dr. *Steigertahl*, F. R. S., dated at *Hanover* Apr. 20, O. S. 1736. Translated from the *French* by *T. S.* M. D., &c. <*Philos. Trans.*, *Abridged by Martyn*, 1732–44, ix, pt. 3, 1747, pp. 71, 72, pl. v, fig. 42.

From *Philos. Trans. Lond.*, no. 447, p. 147. *See* 1738. Steigertahl. [242.]

1748. **Baeck**, Abr. "De cornu Piscis plane singulari carinae navis impacto. <*Acta Acad. Caes. Nat. Cur.*, viii, 1748, pp. 199–217."

Not seen; perhaps not Cetacean. Title from Carus and Engelmann. [243.]

1748. **Ellis**, H. A | Voyage | to | Hudson's-Bay, | by the | Dobbs Galley and California, | In the Years 1746 and 1747, | For Discovering a | North West Passage; | with | An accurate Survey of the Coast, and a short | Natural History of the Country. | Together with | A fair View of the Facts and Arguments from | which the future finding of such a Passage is | rendered probable. | By Henry Ellis, Gent. | Agent for the Proprietors of said Expedition. | To which is prefixed, | An Historical Account of the Attempts hitherto made | for the finding a Passage that Way to the East Indies. | Illustrated with proper Cuts, and a new and correct Chart | of Hudson's-Bay, with the Countries adjacent. | — | London: | Printed for H. Whitridge, at the Royal Exchange. | M.DCC.XLVIII. 1 vol. sm. 8°. pp. i–xxviii, 1–336, map, and cuts.

The plate facing p. 132 gives a figure of "The Great Harpoon for Whales, with its Barb, Coil, & Bouy" used by the Eskimo. On the plate facing p. 134 are figures of "A Sea Unicorn" and "A Whale." In the text there are merely incidental allusions to these animals. The figure of the Whale was doubtless intended for that of *Balæna mysticetus*, but the head is very short in proportion to the whole length of the animal.

A German translation of Ellis appeared at Göttingen in 1750, and a French and a Dutch translation at Leiden the same year, each in 8°, *q. v.* [244.]

1748. **Linné**, C. Caroli Linnæi | Archiatr. Reg. Met. et Bot. Profess. Upsal. | Systema | Naturæ | sistens | Regna tria Naturæ. | in | Classes et Ordines | Genera et Species | redacta | Tabulisque æneis illustrata. | [Monogram.] — | Cum privilegio S. R. M. Polonicæ ac Electoris Saxon. | — | Secundum sextam Stockholmiensem emendatam & auctam | editionem. | — | Lipsiæ, Impensis Godofr. Kiesewetter. | 1748. ll. 3, pp. 1–224, ll. 15, pll. i–vii.

Pisces plagiuri (= *Sirenia* + *Cete*), p. 39. Genera *Trichecus* (1 sp.), *Catodon* (2 spp.), *Monodon* (1 sp.), *Balæna* (3 spp.), *Delphinus* (3 spp.), *Physeter* (2 spp.). Reference only to Artedi and *Faun. Suec.*

Pl. iv, fig. 1, Plagiurus cum cauda horizontali = *Delphinus?* [245.]

1748–56. "**Meyer**, J. D. Angenehmer und nützlicher Zeitvertreib mit Betrachtung curioser Vorstellung allerhand kriechender, fliegender und schwemmender, auf dem Land und im Wasser sich befindender und nährender Thiere. Sowohl nach ihrer Gestalt und ausserlichen Beschaffenheit nach der Natur gezeichnet, gemahlet und in Kupfer gestochen von J. D. Meyer. Nürnberg, 1748–1756. 3 dln. folio. Met 240 gekleurde platen."

Not seen; title from Bosgoed, *op. cit.*, p. 11, no. 126. [246.]

1749. **Condamine**, *M.* de la. Relation abrégée d'un Voyage fait dans l'intérieur de l'Amerique méridionale, depuis la Côte de la Mer du Sud, jusques aux Côtes du Brésil & de la Guiane, en descendant la rivière Amazones. <*Hist. de l'Acad. roy. des Sci. à Paris*, ann. 1745 (1749), pp. 391–492, pl. ix.

Lamentin ou Poisson-bœuf, pp. 464, 465. [247.]

1749. **Gomara**, F. L. de. Francisco Lopez de Gomara, Historia de las Indias. <Historiadores | primitivos | de las Indias occidentales, | que juntó, traduxo en parte, | y facò à luz, ilustrados con eruditas No- | tas, | y copiosos Indices, | el ilustrissimo Señor | D. Andres Gonzalez Barcia, | del Consejo, y camara de S. M. | Divididos en tres Tomos. | Tomo I[–III]. | [Design.] Madrid. Año MDCCXLIX. 3 vols. fol.

Del Pez, que llaman en la Española Manati, vol. ii, cap. xxxi, p. 25. External characters and habits, one half page. [248.]

1750. "ANDERSON, J. Histoire | Naturelle | de l'Islande, | du Groenland, | du Détroit de Davis, | Et d'autres Pays situés sous le Nord, | Traduite de l'Allemand | De M. Anderson, de l'Académie | Impériale, Bourg-mestre en Chef | de la Ville de Hambourg. | Par M * *, de l'Académie Impériale, & | de la Societé Royale de Londres. | Tome Premier [Second]. | [Device.] | A Paris, | Chez Sebastien Jorry, Imprimeur- | Libraire, Quai des Augustins, près | le Pont S. Michel, aux Cigognes. | — | M. DCC. L. | Avec approbation & Privilége du Roi. 2 vols. 18°. Vol. 1, vignette facing title, pp. i–xl, map, pp. 1–314, folding pll. i, ii, opp. p. 84 (birds) and p. 188. Vol. 2, 1 p. l. (title), pp. i–iv, 1–391, unnumbered pll. opp. pp. 54 (birds), 78, 108, 168, 220."

"See the orig. ed., 1746; there are said to be later French eds., of 1754 and 1764."

Not seen; from Coues, *Birds Col. Vall.*, App., 1878, p. 580. [249.]

1750. "ANDERSON, Joh. Beschrijving van IJsland, Groenland en de straat Davis. Verrijkt met (6) platen en een nieuwe kaart van de ontdekkingen. Benevens een voorberigt, bevattende de levensbijzonderheden van den schrijver. Uit het Hoogduitsch vertaald door J. D. T. Te Amsterdam, bij St. van Esvaldt. 1750. 4°."

"... Walvisch. Baarden, spek, traan, bl. 78–82. Waarin van andere visschen te onderscheiden, bl. 157. Onderscheidene soorten en nachrichten van dien visch, bl. 158. Walvischdoder, bl. 104.

"Walvischvangst. Hoe de Groenlanders dezelve verrichten, bl. 221. Waarom de Hollanders daarin beter slagen dan de Denen, bl. 129."

Not seen; title and references from Bosgoed, *op. cit.*, p. 231, no. 3418. There is a later Dutch edition (Amsterdam, 1756, *q. v.*), to which are appended Horrebow's observations. [250.]

1750. "BRING, S. De piscaturis in Oceano Boreali. Lund., Goth. 1750. 4°."

Title from Bosgoed, *op. cit.*, p. 234, no. 3435. [251.]

1750. ELLIS, H. Voyage à la Baye de Hudson, en 1744–47, pour la découverte d'un passage au Nord-Ouëst. Trad. de l'Angl. augmentée, Leide, 1750. 8°. pll. 9.

This French translation is said to have been made by C. Sellius.

For account of the Cetological matter, see the original English ed. of 1748. [252.]

1750. ELLIS, H. Reize naar de Baai van Hudson, ter ontdekkinge van eenen Noord-Wester doortogt. Leiden, 1750. 8°. pll. 9, cuts in text.

Dutch translation of the English edition, 1748, *q. v.* [253.]

1750. ZORGDRAGER, C. G. Cornelius Gisbert Zorgdrager's | Beschreibung | des | Grönländischen | Wallfischfangs | und | Fischery, | nebst einer gründlichen Nachricht | von dem | Bakkeljau-und Stockfischfang | bey | Terreneuf, | und einer kurzen Abhandlung | von | Grönland, Island, Spitzbergen, Nova Zembla, | Jan Mayen Eiland, der Strasse Davids u. a. | Aus dem Holländischen übersezt, und mit accuraten Kupfern und Land- | Charten gezieret. | — | Nürnberg, bey Georg Peter Monath, 1750. 4°. Frontispiece, ll. 3, pp. 1–370, ll. 5.

Frontispiece title-page, printed title-page, plain back. Vorrede des Verlegers, 2 ll., with the last backed by Erklärung des Kupfer-Blates. Einleitung. Von den ersten Erfindern der neuen Küsten und Lande insgemein, pp. 1–15. Then follows the Alte und neue Grönländischen Fischery, pp. 16–302. Zugabe (account of the Cachelot oder Potfisch), pp. 302, 303. Grönländischen Wallfisch-Fang, pp. 304–346. Summarische Nachricht von dem Bakkeljau- und Stockfisch-Fang bei Terreneuf, in den nordlichen Theilen von America, aus den Schrifften des Herrn Denys gezogen, pp. 346–365. Erklärung etlicher fremd- und unbekannten Wörter, etc., pp. 365–370. Register, 5 leaves.

This is apparently a translation of the Dutch edition of 1720, with more or less abridgment, especially the omission of the rhymed passages of the original, and the statistical lists of the Greenland Whale-fishery, with the addition of the Account of the Codfish-fishery of later editions. The copy handled, although apparently in the original binding, lacks all the maps and plates except the frontispiece. [254.]

1751. [DAUBENTON, L. J. M.] Cachalot. <*Encycl., ou Dict. rais. des Sci., des Arts et des Métiers*, ii, 1751, pp. 502, 503. [255.]

1751. **Klein, J. T.** Jacobi Theodori Klein | Secr. Civ. ged. | Soc. reg. Lond. et Acad. Scient. Bonon. | Membri | Qvadrvpedvm | dispositio | brevisque | Historia Natvralis. | [Vignette.] — | Lipsiae | apvd Ionam Schmidt, bibl. Lvbec. | 1751. 4°. ll. 2, pp. 1-127, pll. i-iii + 2 unnumb.

Manatvs, pp. 94, 95. [256.]

1751. **Steller, Georg. Wilhelm.** De Bestiis marinis. <*Nov. Comm. Acad. sci. imp. Petropolitanae*, ii, 1749 (1751), pp. 289–398, pll.

Descriptio Manati seu Vaccae marinae Hollandorum, sea-cow Anglorum, Russorum Morskaia Korowa. Occisad. 12. Iul. 1742, in insula Beringii Americam inter et Asiam in canali sita, pp. 294–330. Descriptio partium externarum, pp. 296–309. Descriptio internarum partium, pp. 309–318. Ossium brevis descriptio, pp. 318–320. Descriptio morum et naturae, pp. 320–330. [257.]

1751. [**Vandenesse, *M.* de.**] Baleine. <*Encycl., ou Dict. rais. des Sci., des Arts et des Métiers*, ii, 1751, pp. 32–36.

Baleine, pp. 32, 33. Pêche de la baleine, pp. 33–36. Le blanc de la baleine, p. 36. [258.]

1752. **Hill, John.** An | History | of | Animals. | Containing Descriptions of the | Birds, Beasts, Fishes, and Insects, | of the | Several parts of the World; | and | Including Accounts of the several Classes of Animalcules, | visible only by the Assistance of Microscopes. | In these | The Characters, Qualities, and Forms of the several Creatures are | described, the names by which they are commonly known, as well as those by | which Authors, who have written on the Subject, have called them are explained: | And each is reduced to the Class to which it naturally belongs. | Illustrated with Figures. | — | By John Hill, M. D. | Acad. Reg. Scient. Burdig. &c. Soc. | — | London: | Printed for Thomas Osborne, in Gray's-Inn. | — | MDCCLII. 2°. ll. 4, pp. 1–584, ll. 2, pll. i–xxviii, colored.

Fishes. Class the Fifth. Plagiuri, Cetaceous Fishes, pp. 310–317. *Physeter*, 2 spp., p. 310; *Delphinus*, 3 spp., pp. 310, 311; *Balæna*, 4 spp., pp. 312–314; *Monodon*, 1 sp., p. 314, pl. xvi; *Catodon*, 1 sp., p. 315; *Trichechus*, p. 317. A short but very good general account of the subject. The specific names adopted are English, but the species are referred to Linnæan genera. [259.]

1752. **Scilla, Augustino.** De | Corporibus Marinis | Lapidescentibus | quæ defossa reperiuntur | Auctore Augustino Scilla | addita dissertatione | de Glossopetris | Editio altera emendatior. | [Vignette.] Romæ, MDCCLII. | Sumptibus Venantii Monaldina Bibliopolæ in via Curfus. | — | — | Ex Typographia Linguarum Orientalium | Angeli Rotilii, et Philippi Bacchelli. | In Ædipus Maximorum. | Superiorvm permissv. | 4°. pp. i-viii, 1-84, ll. 3, pll. i-xxviii + 1 & frontis.

In this edition (*see* Scilla at 1670 and 1747) the description of the Squalodont remains is at p. 55. The plates are apparently from the original etchings. [260.]

1753. **Anon.** "Naamlyst . . . van alle de Commandeurs, die sedert 1700 op Groenland en de Straat Davids voor Holland hebben gevaren . . . hoeveel vissen en vaten spek ieder heeft aangebragt. Zaandam, 1753. 4°."

Not seen; title from Fr. Muller's *Cat. Amer. Books*, 1877, p. 127, no. 2214. For an apparently later edition of the same work, *see* 1770. Sante, G. van. [261.]

1753. **Bond, J.** An account of a machine for killing of *Whales*, proposed by *John Bond*, M. D. <*Philos. Trans. Lond.*, xlvii, art. lxxi, 1753, pp. 429–435.

On account of the difficulty in propelling the harpoon to a sufficient distance, the writer recommends the use of the ancient *balista*, with certain modifications to suit the exigencies of the occasion. [262.]

1753. **Steller, G. W.** Georg Wilhelm Stellers | ausführliche | Beschreibung | von sonderbaren | Meerthieren, | mit Erläuterungen und nöthigen Kupfern | versehen. | [Vignette.]— | Halle, | in Verlag, Carl Christian Kümmel. | 1753. | 8°. ll. 9, pp. 1–48.

Beschreibung eines Manati oder Meerkuh, welches Thier den 12ten Julii 1742 auf der Insul Bering, die zwischen America und Asien im Canal gelegen ist, getödtet werden, pp. 48–107.

Detailed account of its external and internal anatomy. This work contains, (1) "Zur Einleitung. Anatomie eines Meerkalbes, von Johann Adam Kulmus, in *Actis Nat. Cur.*, vol. i, obs. 5," pp. 1–41; (2) "Georg Wilhelm Stellers Abhandlung von Meerthieren," pp. 41–218, a translation of *De Bestiis marinis*. *See* 1751. Steller, G. W. [26

1753–54. PONTOPPIDAN, E. Erich Pontoppidans, D. | Bischofs über das Stift Bergen in Norwegen und Mit- | glieds der Königl. Dän. Societät der Wissenschaften | Versuch | einer | natürlichen | Historie | von Norwegen, | Worinnen die Luft, Grund und Boden, Gewäs- | ser, Gewächse, Metalle, Mineralien, Steinarten, Thiere, | Vögel, Fische und endlich das Naturel, wie auch die | Gewohnheiten und Lebensarten der Einwohner | dieser Königreichs beschrieben werden. | Erster Theil. | Aus dem Dänischen übersetzt | von | Johann Adolph Scheiben, | K. D. C. | — | Mit Kupfern. | — | Kopenhagen, | Bey Franz Christian Mumme, | 1753. Zweiter Theil, 1754. 8°. Erster Theil, pp. 1–367, mit 16 Tafeln; Zweiter Theil, pp. 1–56, 1–536, mit 14 Tafeln.

Wallfisch, Zweiter Theil, pp. 223–234.

The species designated are: **1.** Hvalfisk, pp. 223–232. This relates mainly to the Greenland Whale (*Balæna mysticetus*), but also contains some reference to the Sperm Whale; the figure (pl. facing p. 209) is that of *Physeter macrocephalus*. **2.** Tuequal (the Plockfisch of the Germans), p. 232. **3.** Rörqval, p. 232. **4.** Troldqual, p. 232. **5.** Springhval, pp. 232, 284, pl. facing p. 285. **6.** Nebbe-Hval, p. 233, pl. facing p. 209, fig. orig. This last, named also *Balæna rostrata*, is evidently one of the Beaked Whales, but the others are too briefly mentioned to be identified. **7.** Marsvin, p. 257. **8.** Narhval, p. 359, pl. facing p. 247.

For further comment see *infrà* (1755), the English ed. [264.]

1753–54. WAGENAAR, JAN. Vaderlandsche | Historie, | vervattende de | Geschiedenissen | der Vereenigde Nederlanden, | inzonderheid die van | Holland, | van de vroegste tydenaf: | Uit de geloofwaardigste Schryvers en egte Gedenk- | stukken samengesteld. | Met Konst plaaten en Karten opgehelderd. | . . . Te Amsterdam, | By Isaak Tidrion. | 21 vols. 8°. 1749–1759.

Potwalvisch, by Kalwyk, gestrand, ix, 1753, pp. 37, 38. Begensels der Walvischvangst, x, 1754, pp. 67 *et seq.* Walvisschen voor Scheveningen gestrand, x, p. 158. [265.]

1754. ANON. ? "Seeeinhorn. <*Berlin. wöchentl. Relat. der Merkw. Sachen a. d. Naturreiche*, 1754, p. 719."

Not seen; title from Donndorff, *Zool. Beytr.*, i, 1792, p. 756. [266.]

1754. CATESBY, M. The | Natural History | of | Carolina, Florida, and of the Bahama Islands: | Containing the Figures of | Birds, Beasts, Fishes, Serpents, Insects and Plants: | Particularly the Forest-Trees, Shrubs, and other Plants, not hitherto described, | or very incorrectly figured by Authors. | Together with their Descriptions in English and French. | To which are added, | Observations on the Air, Soil, and Waters: | With Remarks upon | Agriculture, Grain, Pulse, Roots, &c. | To the whole is prefixed a new and correct Map of the Countries treated of. | By the Late Mark Catesby, F. R. S. | Revis'd by Mr. [George] Edwards, of the Royal College of Physicians, London. | — | Vol. I [II]. [French version of the title follows.] London: | Printed for C. Marsh, in Round Court in the Strand; T. Wilcox, over-against the new Church, in the Strand; and B. Stichall in Clare-Court. | — | MDCCLIV. 2 vols. fol. pll. col.

This is said to be identical with the original edition of 1731–33. Coues (*op. cit.*) gives a collation of the 1771 ed.

Page xxxii of the "Account of Carolina and the Bahama Islands" contains 2 lines about "Whales" and 10 lines about "The Porpesse," neither of any importance. [267.]

1754. DAUBENTON, L. J. M. Dauphin, *delphinus*. <*Encycl.*, *ou Dict. rais. des Sci.*, *des Arts et des Métiers*, iv, 1754, p. 645. [268.]

1755. ANON. ? "Free and impartial remarks on the real importance of the Whalefishery. London, Cooper. 1755. 8°."

Not seen; from Bosgoed, *op. cit.*, p. 251, no. 3600. [269.]

1755. PONTOPPIDAN. The | Natural History | of | Norway: | containing | A particular and accurate Account of the Temperature of the Air, the | different Soils, Waters, Vegetables, Metals, Minerals, Stones, Beasts, | Birds, and Fishes; together with the Dispositions, Customs, and | Manner of Living of the Inhabitants: Interspersed with Physiological | Notes from eminent Writers, and Transactions of Academies. | In Two Parts. | Translated from the Danish

1755. **Pontoppidan**—Continued.

Original of the | Right Rev^{d}. Erich Pontoppidan, | Bishop of Bergen in Norway, and Member of the Royal Academy | of Sciences of Copenhagen. | Illustrated with Copper Plates, and a General Map of Norway. | — | [Vignette.] — | London: | Printed for A. Linde, Bookseller to Her Royall Highness the Princess Dowager of Wales, in Catherine-Street in the Strand. | — | MDCCLV. fol. Pt. i, pp. i–xxiv, 1–206; pt. ii, pp. i–viii, 1–292, ll. 6, map, pll. 18, mostly unnumbered.

Part ii, pp. 118–151, *Cetacea, passim*. **1.** Hval-fisk, or Qual, the Whale, pp. 118–123 = *Balæna mysticetus*, principally, but in the account of this species several others are incidentally mentioned; **2.** Herring-Whale, pp. 120, 145, doubtless some kind of Finner Whale; **3.** Tuequal, or Bunch-back'd Whale, p. 123 = ? *Megaptera longimana;* **4.** Spring-hval, or Springeren, p. 123 = *Balænoptera rostrata* (*cf.* Fabricius, *Faun. Groenl.*, p. 40); **5.** *Balæna rostrata*, or Nebbe-hval, the Beaked Whale, p. 123 = *Hyperoodon rostrata;* **6.** Doglingen, p. 124 = ? *Globiocephalus melas;* **7.** Marsvin, or Porpesse, which is here called Nice, and also Tumler, the Tumbler, p. 136 = *Phocœna communis*, at least in part; **8.** Narhval, Unicornu Marinum, the Unicorn Fish, p. 137, pl. marked "no. 4," but apparently no. 22 of the list at the end of the volume = *Monodon monoceros;* **9.** Spek-hugger, or Vahu, pp. 122, 150, figured on pl. "no. 5" (= no. 21 of the list at the end of the volume), described as "in shape much like a Porpesse, and about four feet long," with a sharp snout and "very keen teeth," and "long projecting jaws," and is said to prey upon the Whales, but the account as a whole cannot be referred to any known species. It is impossible to say whether it be really a Cetacean.

Plates described as "20, 21, 22, Of Fishes, page 163" in the directions to the binder on the reverse of p. 291 of pt. ii, embrace, among numerous other figures not Cetacean, **1.** The Whale = *Physeter macrocephalus*, **2.** "The Goosebilled Whale," a caricature of probably some species of *Hyperoodon*, **3.** A Whale with two speta huggers, apparently a Delphinoid, attacked by two of the "Spek-huggers" described at p. 150. There is no reference to these figures in the text, and the names of none of them exactly correspond with those of the species there described. **4.** The Narwhal—an odd caricature copied from an earlier author. None of the figures are in fact original.

Pontoppidan's account of the Whale tribe is largely derived from preceding authors, the rest being based mainly on accounts received from fishermen. The author frankly states that he never saw a Whale except once, and then only the back of one as it came to the surface of the water to breathe. It is of interest chiefly as a record of the myths then prevalent respecting these creatures. His notices of them are interspersed among those of the Viviparous Fishes. One specific name still current (*Balæna* ROSTRATA) for a species of *Hyperoodon* dates from Pontoppidan. [270.]

1756. "**Anderson, J.** Beschryving | van | Ysland, | Groenland | en de Straat Davis. | Bevattende zo wel ene bestipte bepaling van de ligging en | grote van die Eilanden, als een volledige ontvouwing van hunne | inwendige gesteltenis, vuurbrakende Bergen, heete en war- | me Bronnen enz. een omstandig Bericht van de Vruchten | en Kruiden des Lands; van de wilde en tamme Landdie- | ren, Vogelen en Visschen, de Visvangst der Yslanders | en hunne onderscheide behandeling, toebereiding en | drogen der Visschen, voorts het getal der Inwoon- | ders, hunnen, Aart, Levenswyze en Bezigheden, | Woningen, | Kledingen, Handteering, Arbeid, | Veehoedery, | Koophandel, Maten en Ge- | wichten, Huwelyks Plechtigheden, Opvoe- | ding hunner Kinderen, Godsdienst, Ker- | ken en Kerkenbestuur, Burgerlyke Rege- | ring, Wetten, Strafoeffeningen en wat | wyders tot de Kennis van een Land | vereischt word. | Door den Heer | Johan Anderson, | Doctor der Beide Rechten, en in Leven eerste Burgermeester | der vrye Keizerlyke Ryksstad Hamburg. | Verrykt met Platen en een nieuwe naauwkeurige Landkaart der | ontdekkinge, waar van in dit Werk gesproken word. | Uit het Hoogduits vertaalt. | Door | J. D. J. | Waar by gevoegt zyn de Verbeteringen | Door den Heer Niels Horrebow, | Opgemaakt in zyn tweejarig verblyf op Ysland. | [Designs.] | Te Amsterdam, | By Jan van Dalen, Boekverkoper op de Colveniersburgwal | by de Staalstraat. 1756. 1 vol. sm. 4°. Full-page vignette, title, both backed blank, 7 more unpaged ll. ('Voorbericht'), map, pp. 1–285+3 ll. ('Bladwyzer'); with 5 pll. at pp. 34 (birds), 149 (birds), 172, 189, 216. *To which is appended:* Verbeteringen | Wegens de | Beschryving | Van het Groot Eyland | Ysland, | Beschreven | Door den Heer | Johan Anderson. | Opgemaakt in een tweejarig

1756. "ANDERSON, J.—Continued.
verblyf | op dat Eyland, | Door den Heer | Niels Horrebow. 5 unpaged ll., pp. 1-158."

Not seen; title from Coues, *Birds Col. Vall.*, 1878, p. 581. This is the later Dutch edition referred to above at 1750. It is by the same translator, with the addition of Horrebow's memoir, but is issued by a different publisher. See the references to the cetological matter given from Bosgoed for the ed. of 1750. *See, also*, HORREBOW, N., at 1769. [271.]

1756. BRISSON, M. J. Regnum animale | in Classes IX distributum, | sive | Synopsis Methodica | sistens generalem Animalium | distributionem in Classes IX, & duarum primarum | Classium, Quadrupedum scilicet & Cetaceorum, parti- | cularem divisionem in Ordines, Sectiones, Genera & | Species, | Cum brevi cujusque Speciei, | descriptione Citationibus Auctorum de iis tractantium, | Nominibus eis ab ipsis & Nationibus impositis, Nominibus- | que vulgaribus. | A D. Brisson, Historiæ Naturalis Musei Realmuriani | Demonstratore. | Cum Figuris æneis. | — | [Vignette.] | Parisiis, | Ad Ripam Augustinorum. | Apud Cl. Joannem-Baptistam Bauche, Bibliopolam, ad | Insigne S^tæ^. Genovefæ & S^ti^. Joannis in Deserto. | M. DCC. LVI. | — | Cum privilegio Regis & Approbatione. pp. i-vii, 1-382.

[*Or*],

Le Regne Animal | divisé en IX Classes, | ou | Méthode | contenant la division generale des | Animaux en IX Classes, & la division particuliere | des deux premieres Classes, sçavoir de celle des | Quadrupedes & de celle des Cetacées, en Ordres, | Sectiones, Genres & Espéces. | Aux quelles on a joint une | courte description de chaque Espéce, avec les Citations | des Auteurs qui en ont traité, les Noms qu'ils leurs ont | donnés, ceux que leurs ont donnés les différentes | Nations, & les noms vulgaires. | Par M. [Mathurin Jacques] Brisson, Démonstrateur du Cabinet d'Histoire | Naturelle de M. de Reaumur. | Avec Figures en taille douce. [Vignette.] A Paris, | Quay des Augustins. | Chez Cl. Jean-Baptiste Bauche, Libraire, à l'Image Sainte | Geneviéve & S. Jean dans le Desert. | M.DCC.LVI. | — | Avec Privilego du Roi & Approbation. 4°. ll. 2, pp. i-vj, l. 1, pp. 1-382, l. 1. Text in both Latin and French.

Genus *Odobeni* = *Sirenia* + Walruses, pp. 48-51.—Le Lamantin, *Manatus* (= genn. *Manatus* et *Halicore*), pp. 49-51.

Classe ii. | Les Cetacées. | [ou] Classis ii. | Cetacea. [half-title, p. 341], pp. 341-382.

The Cetacea are divided into four orders:

Order I. *Cetacea edentula*, with 1 genus, *Balæna*, and 7 species, to wit: **1.** *Balæna vulgaris Groenlandica*, p. 347 = *B. mysticetus*; **2.** *Balæna Islandica*, p. 350 = *B. biscayensis*; **3.** *Balæna Novæ Angliæ*, p. 351 = "Bunch or Hump-back-whale" of the English; **4.** Balæna bipinnis, sex in dorso gibbis, p. 351 = *B. gibbosa*, Erxleben or "Snag Whale" of Dudley; *Agaphelus gibbosus*, Cope; **5.** Balæna tripinnis, ventri levi, p. 352; **6.** Balæna tripinnis, ventre rugoso, rostro rotundo, p. 353 = *Physalus antiquorum*; **7.** Balæna tripinnis, ventre rugoso, rostro acuto, p. 355 = *Balænoptera rostrata*.

Order II. *Cetacea dentata in maxillâ inferiore tantùm*, with 1 genus, *Cetus*, and 7 species. **1.** Cetus, p. 356 = *Physeter macrocephalus*; **2.** *Cetus albicans*, p. 359 = *Beluga catodon*. **3.** *Cetus Novæ Angliæ*, p. 360 = "Sperma Ceti Whale" of Dudley, héncе *Physeter macrocephalus*; **4.** *Cetus minor*, p. 361 = *Physeter macrocephalus*, juv.; **5.** Cetus tripinnis, dentibus acutis, rectis, p. 362 = *Physeter macrocephalus*; **6.** Cetus tripinnis, dentibus acutis, arcuatus, falciformis, p. 363 = *Physeter macrocephalus*; **7.** Cetus tripinnis, dentibus in planum desinentibus, p. 364 = *Physeter macrocephalus*.

Order III. *Cetacea dentata in maxillâ superiore tentùm*, with 1 genus, *Ceratodon*, and 1 species: *Ceratodon* = *Monodon monoceros*.

Order IV. *Cetacea dentata in utrâque maxillâ*, with 1 genus, *Delphinus*, and 5 species, to wit: **1.** *Delphinus*, p. 369 = *Delphinus delphis*; **2.** *Phocæna*, p. 371 = *Phocæna communis*; **3.** Delphinus pinnâ in dorso unâ Gladii recurvi æmulâ, dentibus acutis, rostro quasi truncato, p. 372 = *Physeter macrocephalus*; **4.** *Orca*, p. 373 = *Orca gladiator*; **5.** *Physeter*, p. 374 = *Physeter macrocephalus*.

Total, 4 genera, 20 species. Of the latter no less than 7 are based on different accounts of the Sperm Whale, the author compiling indiscriminately from Sibbald, Artedi, Klein, etc. [272.]

1756. LINNÉ, C. Caroli Linnæi | Archiatr. Reg. Med. et Bot. Profess. Upsal. | Systema | Naturæ | sistens Regna tria Naturæ | in | Classes et Ordines | Genera

1756. Linné, C.—Continued.
et Species | redacta, | tabulisque æneis illustrata. | Accedunt vocabula Gallica. | Editio multo auctior & emendatior. | [Vignette.] Lugduni Batavorum, | Apud Theodorum Haak, | MDCCLVI. 8°. ll. 4, pp. 1–227, ll. 9+4, pll. i–viii.

Classis iv. Pisces. Ordo 8. Plagiuri. Genn. *Trichecus*, *Catodon*, *Monodon*, *Balæna*, *Delphinus*, *Physeter* (pp. 39, 40). *Trichecus* here includes the single species "1. Manatus . . . la Lamantin." *Catodon* has 2 species; *Monodon*, 1; *Balæna*, 4; *Delphinus*, 3; *Physeter*, 2 = genn. 6, spp. 13. [273.]

1757. Bond, John. Bericht wegens een Werktuig om Walvissen te Schieten. <*Houtuyn's Uitgezogte Verhandl. uit de Nieuwste Werken van de Societieten der Wetensch. in Europa*, etc., i Band, ii Deel, 1757, pp. 1–10.

From: *Phil. Trans.*, 1757, vol. xlvii, pp. 429 *et seq.* *See* 1751. Bond, J. [274.]

1757. "Debes, L. Jac. Naturliche und Politische Historie der Inseln Farõe, worinn die Luft, Grund und Boden, Gewässer, Thiere, Vögel, Fische, etc., das Naturel, die Gewohnheiten, Lebensart der Einwohner dieser Inseln und ihre Verfassung beschrieben werden. Aus dem Dänischen übersetzt. Kopenhagen und Leipzig, Pelt, 1757. 8°. Met kopergrav."

Not seen; from Bosgoed, *op. cit.*, p. 50, no. 773. For account of the cetological matter of Debes's work, see English version, at 1676. [275.]

1757. Horrebow, N. The | Natural History | of | Iceland: | containing | A particular and accurate Account of the different Soils, burning Moun- | tains, Minerals, Vegetables, Metals, Stones, Beasts, Birds, and Fishes; | together with the Disposition. Customs, and Manner of Living of | the Inhabitants. Interspersed with an Account of the Island, by | Mr. Anderson, late Burgo-master of Hamburgh. | To which is added, a Meteorological Table, with Remarks. | Translated from the Danish Original of N[iels]. Horrebow. And illustrated with a New General Map of the Island. | — | London: | . . . [=names of booksellers, 4 lines]. MDCCLVII. 2°. pp. i–xx, 1–207, map.

Chap. lxv. Concerning the Whale. Chap. lxvi. Concerning the porpus, pp. 85–87. Brief account of the capture and uses of these animals. [276.]

1758. Borlase, William. The | Natural History | of | Cornwall. | The | Air, Climate, Waters, Rivers, Lakes, Sea, and Tides; | Of the Stones, Semimetals, Metals, Tin, and the Manner of Mining; | The Constitution of the Stannaries; | Iron, Copper, Silver, Lead, and Gold, found in Cornwall. | Vegetables, Rare Birds, Fishes, Shells, Reptiles, and Quadrupeds: | Of the Inhabitants, | Their Manners, Customs, Plays or Interludes, Exercises, and Festivals; | the Cornish Language, Trade, Tenures, and Arts. | Illustrated with a new Sheet Map of the County, and Twenty-Eight Folio | Copper-Plates from Original Drawings taken on the Spot. | — | By William Borlase, A. M. F. R. S., | Rector of Ludgvan, and Author of the Antiquities of Cornwall. | — | - - - - - - - - - Natale solum dulcedine captos | Ducit. | — | Oxford, | Printed for the Author; by W. Jackson: | Sold by W. Sandby, at the Ship in Fleet-Street London; and the Booksellers of Oxford. | — | MDCCLVIII. fol. pp. i–xix, 1–326, l. 1.

Sect. ii. Sea-fish, and first cetaceous, pp. 263, 264, pl. xxvii, figg. i, 2.

The "blower, or fin-fish (*Physeter* of authors)," p. 263. "The grampus, or *Porcus marinus major* of Ray," p. 263. "The porpesse, *Porcus marinus seu Phocæna vel Tursio*," etc., p. 264, pl. xxvii, fig. 2. "The dolphin, the *Delphinus* of the ancients and moderns," p. 264, pl. xxvii, fig. 1. The figures are from the drawings "of that accurate Ichthyologist, the late Reverend Mr. Jago of Loo." [277.]

1758. Gumilla, J. Histoire | Naturelle, Civile | Et Geographique | de | L'Orenoque. | Et des principales Riviéres qui s'y jettent. | Dans laquelle on traite du Gouvernement, | des usages & des coûtumes des Indiens | qui l'habitent, des animaux, des arbres | des fruits, des résines, des herbes & | des racines médicinales qui naissent dans | le Païs. On y a joint le détail de plusieurs | Conversions remarquables & édifiantes. | Par le Pere Joseph Gumilla, de la | Compagnie de Jesus, Supérieur des Missions de l'Orenoque. | Traduite de l'Espagnol

1758. **Gumilla, J.**—Continued.
sur la Seconde | Edition, par M. Eidons ci-devant | Ingenieur des Armées de S. M. C. | Tome Second. | [Ornament.] A Avignon, | Chez la Veuve de F. Girard, Imprimeur. | Et se vend, | A Marseille, | Chez D. Sibié, Imprimeur du Roi, | & Jean Mossi, Libraire. | — | M. DCC. LVIII. 3 vols. 12°.

Poissons de l'Orénoque. Moyens industrieux dont les Indiens se servent pour les prendre. Vertus Médicinales des Pierres & des Os qu'on trouve dans quelques uns. Tom. ii, chap. xxi, pp. 36–58.—Manati, pp. 43–55.

For comment, see the Spanish edition of 1745. [278.]

1758–77. "**Gmelin, Ph. F.**, *und* **Christmann, G. F.** Onomatologia medica completa, seu Onomatologia historiae naturalis, oder vollständ. Lexicon das alle Benennungen der Kunstwörter der Naturgesch. nach ihrem ganzen Umfang erklärct u. den reichen Schatz der ganzen Natur durch deutliche u. richtige Beschreibungen des nützlichen u. sonderbaren von allen Thieren, Pflanzen u. Mineralien sowohl vor Aerzte als andere Liebhaber in sich fasst zu allgemeinem Gebr. von einer Gesellschaft naturforschender Aerzte nach den richtigsten Urkunden zusammengetragen. 7 Bde. A–Z. (1–4 von Ph. F. Gmelin, 5–7 von G. F. Christmann). gr. 8°. Ulm; Frankfort u. Leipzig, 1758,'61,'66,'73,'75,'77."

Not seen; title at second hand, but source not noted.

Cetaceen, *passim*. [279.]

1759. **Scilla, Augustino.** De | Corporibus Marinis | Lapidescentibus | quæ defossa reperiuntur | Auctore Augustino Scilla | addita dissertatione | Fabii Columnæ | de Glossopetris | Editio altera emendatior. | [Vignette.] Romæ MDCCLIX. | Sumptibus Venantii Monaldini Bibliopolæ in via Cursus. | — | — | Ex Typographia Joannis Zempel | Prope Montem Jordanum. | Svperiorvm permissv. 4°. ll. 4, pp. 1–82. ll. 3, pll. i–xxviii+1 and frontis.

This third Latin edition (*see* Scilla, at 1670, 1749, and 1752) seems to be textually the same as the first and second, with modifications of title-page and accessories. The matter relating to the Squalodont remains occurs at p. 54; the plates are identical with those of the earlier editions. [280.]

1760. **Douglass, W.** A | Summary, | Historical and Political, | of the | First Planting, Progressive Improvements, | and Present State of the British Set- | tlements in North America. | Containing |

I. Some general Account of ancient | and modern Colonies, the grant- | ing and settling of the British | Continent and West India Island | Colonies, with some transient | Remarks concerning the adjoin- | ing French and Spanish Settle- | ments, and other Remarks of | various Natures.
II. The Hudson's-Bay Company's | Lodges, Fur and Skin Trade. |
III. Newfoundland Harbours and | Cod-Fishery.
IV. The Province of L'Acadie or | Nova Scotia; with the Vicissi- | tudes of the Property and Ju- | risdiction thereof, and its present | State.
V. The several Grants of Saga- | dahock, Province of Main, Mas- | sachusetts-Bay, and New-Ply- | mouth, united by a new Char- | ter in the present Province of | Massachusetts - Bay, commonly | called New-England.

By William Douglass, M D. | Vol. I. [-II] | — | Ne quid falsi dicere audeat, ne quid veri non audeat. Cicero. | — | London, | Printed for R. & J. Dodsley, in Pall-mall. | MDCCLX. | 2 vols. 8°.

The title-pages of the two volumes differ only in respect to the matter detailing the contents of the volumes. There appears to have been an earlier [1755] edition, from which this seems to be not textually different.

A digression concerning whaling, vol. i, pp. 56–61. Ambergris and spermaceti are described; eight different kinds of Whales are briefly described, with some account of the products of each of the habits of Whales, and of whaling.

A digression concerning fisheries, *ibid.*, pp. 294–304. I. Whales, pp. 296–298. This gives an account of the New England Whale-fishery as it existed in 1748, with remarks on the habits of the Whales pursued, and is of especial importance. [281.]

1761. Charlevoix, P. [F. X. de]. Journal | of a | Voyage | to | North-America. | Undertaken by Order of the | French King. | Containing | The Geographical Description and Natural | History of that Country, particularly | Canada. | Together with | An Account of the Customs, Characters, | Religion, Manners and Traditions | of the original Inhabitants. | In a Series of Letters to the Duchess of Lesdiguieres. | Translated from the French of P. de Charlevoix. | In two volumes. | Vol. I. | — | London: | Printed for R. and J. Dodsley, in Pall-Mall. | — | MDCCLXI. 2 vols. 8°. Vol. i, pp. i–viii, 1–382, 1 map. Vol. ii, pp. i–viii, 1–380, ll. 13.

The passage about Porpoises and Whales is in vol. i, pp. 227–230. *See, also*, Charlevoix, at 1744 and 1763. [282.]

1762. Houttuyn, F. Natuurlyke Historie | of | Uitvoerige Beschryving | der | Dieren, Planten | en | Mineraalen, | Volgens het Samenstel van den Heer | Linnæus. | Met naauwkeurige Afbeeldingen. | — | Eerste Deels, Derde Stuk. | Vervolg der | Zoogende Dieren. | [Vignette.] Te Amsterdam, | By F. Houttuyn. | MDCCLXII. 8°. ll. 3, pp. 1–554, ll. 2, pll. xxii–xxviii.

Cetacea, pp. 423–554. **1.** Eenhoorn-Visch, pp. 423–441; **2.** *Mysticetus*, Groenlandsche Walvisch, pp. 442–477 (Historie der Walvisch-Vangst, pp. 457–477); **3.** *Physalus*, Vinvisch, pp. 477–485; **4.** *Boops*, Ossen-Oog, pp. 485–487; **5.** *Musculus*, Breedsmoel, 487–500; **6.** *Catodon*, pp. 503–505; **7.** *Macrocephalus*, Potvisch, pp. 505–530; **8.** *Microps*, Klein-Oog, pp. 530–536; **9.** *Tursio*, Mastvisch, pp. 536–539; **10.** *Phocæna*, Bruinvisch, pp. 540–543; **11.** *Delphis*, Dolphyn, pp. 543–547; **12.** *Orca*, Botskop, pp. 547–554. [283.]

1762. "Jonaeus, W. Dissertatio de piscatura, cujus particula prima, de quibusdam Balaenis in mari Islandico captis vel ad littora ejectis, earumque usu, praecipue occasione libri, dicti Su Konunglega Skuggsja, sive speculum regale, resp. J. Jonaeus. Hafniae, 1762. 10 bladz."

Not seen; from Bosgoed, *op. cit.*, p. 239, no. 3489. [284.]

1762. Spilman, H. "Cachelot, gestrand tússchen Zandvoort en Wyk op Zee, 1762. Naar J. Augustini door H. Spilman. br. folio."

From Bosgoed, *op. cit.*, p. 176, no. 2777. [285.]

1762 (*circa*). Vinne, V. van der. "Cagelot, lang 61 voeten, den 20 Febr. 1762 tussen Zantvoort en Wijk-op-Zee aangedreeven. Door *V. van der Vinne.* br. 4°."

From Bosgoed, *op. cit.*, p. 176, no. 2778. [286.]

1763. Bellin, S. Déscription | Géographique de la Guyane. | Contenant | les Possessions et les Etablissemens | des François, des Espagnols, des Portugais, | des Hollandois dans ces vastes Pays. | Le Climat les Productions de la Terre et les Animaux | Leurs Habitans, leurs Moeurs, leurs Coutumes. | et le Commerce qu'on y peut faire. | Avec des Remarques pour la Navigation et des | Cartes, Plans, et Figures, | Dressées au Dépost des Cartes et Plans de la Marine | Par Ordre de M le Duc de Choiseul Colonel | Général des Suisses et Grisons, Ministre de la | Guerre et de la Marine. | Par le S. Bellin Ingenieur de la Marine et du | Depost des Plans, Censeur Royal, de l'Academie de | Marine et de la Société Royale de Londres. | M.DCC.LXIII. 4°. pp. i–xiv (pl. title and engr. title, which is the one here given, and "Avertissement"), l. 1, pp. 1–294, l. 1, maps, numerous plans, and pll. i–x.

Le Manati, pp. 65, 66, pl. v (Péche du Lamentin par les Indiens; Lamenum, Manate, Vache Marine). Description apparently original; figure a copy from Labat (see 1724. Labat R. R.). [287.]

1763. Charlevoix, [P. F. X. de]. Letters | to the | Dutchess of Lesdiguieres; | Giving an Account of a | Voyage to Canada, | and | Travels through that vast Country, | and | Louisiana, to the Gulf of Mexico. | Undertaken | by Order of the present King of France. | By Father Charlevoix. | . . . [=28 lines of small type in 2 columns, giving description of contents of the work.] Printed for R. Goadby, and Sold by R. Baldwin, in Pater- | Noster-Row, London. 1763. 8°. pp. i–xiv, 1 l., pp. 1–384. Without maps.

The passage relating to Porpoises and Whales is at pp. 81–88.
See the original edition, 1744; also the earlier (1761) English edition. [288.]

1763. EGEDE, H. Herrn Hans Egede, | Missionârs und Bischofes in Grönland, | Beschreibung | und | Natur-Geschichte | von | Grônland, ûbersetzet | von | D. Joh[ann]. Ge[org]. Krûnitz. | [Vignette.]— | Mit Kupfern. | — | Berlin, | verlegts August Mylius. | 1763. 8°. pp. i–xii, 1–237, i–xi Tafeln.

Cetacea, pp. 89–106, iv, v Tafeln. **1.** Fin-Fisch, p. 89, Taf. iv; **2.** Bart-Fisch, p. 90, Taf. iv; **3.** Nordcaper, p. 95; **4.** Schwerdfisch, p. 96; **5.** Cachelot, oder Pot-Fisch, p. 97; **6.** Weissfisch, p. 98, Taf. v; **7.** Buttskopf, p. 98 = *Hyperoodon*, sp.; **8.** Seeeinhorn. Einhornfisb. Narwal, p. 99, Taf. v, animal and skull; **9.** Der Niser oder das Meerschwein, p. 105. Wallfischfang, pp. 124–127. [289.]

1763. GRONOVIUS, LAUR[ENTIUS] THEOD[ORUS]. Zoophylacii | Gronoviani | Fasciculus primus | exhibens | Animalia | Quadrupeda, | Amphibia | atque | Pisces, | quae in | Museo suo adservat, rite examinavit, syste- | matice disposuit, descripsit, atque | iconibus illustravit | Laur. Theod. Gronovius, J. U. D. | Civitatis Lugduno-Batavae Senator, Societatis Physico- | medicae Regiae Londinensis, Basilaeensis, | atque Hollandicae Socius. | [Ornament.] Lugduni Batavorum | sumptibus Auctoris. | MDCCLXIII. fol. Fasc. I. 2 ll., pp. 1–136; Fasc. II. Insectorum. 1764. pp. 137–236, i–iv, pll. i–xvii+viii*.

Plagiuri, pp. 29, 30.—The only species described is (no. 139) *Balæna dorso impenni*, (nearly = *Balæna mysticetus*), of which there is a detailed account of the external characters, including measurements. [290.]

1764. HORREBOW, N. Nouvelle | Description | physique-historique, | civile et politique | de l'Islande, | avec | des observations | critiques | sur l'Histoire naturelle | de cette Isle, | Donnée par M. [Johann] Anderson. | Ouvrage traduit de l'Allemand, de M. | [Niels] Horrebows [*sic*], qui y a été envoyé | par le Roi de Danemarck. | Tome premier [et second]. | — | A Paris, | Chez Charpentier, Libraire, rue du Hurepoix, | à l'entrée du Quai des Augustines. | — | M. DCC. LXIV. | Avec Approbation, & Privilege du Roi. 2 vols. 12°. Vol. i, pp. i–xlij, 1–368; vol. ii, pp. i–v, 1–372.

De la Baleine, i, pp. 305–311. Du Marsouin, pp. 311–313.

This work is a critical commentary upon that portion of Anderson's "Nachrichten von Island, Grönland," etc., relating to Iceland. The matter relating to Cetacea is not of high importance.

This French version, as the translator himself avows, is more or less abridged, and very freely rendered.—Vol. i is wrongly paged from p. 264 to the end, through an omission in the pagination of 9 numbers (265–272 inclusive). [291.]

1764. [KRASHENINNIKOF, S. P.] The | History | of | Kamtschatka, | and the | Kurilski Islands, | with the | Countries adjacent; | Illustrated with | Maps and Cuts. | [By Stepan Petrovitch Krasheninnikof.] Published at Petersbourg in the Russian Language, by Order of her Imperial Majesty | and translated into English | By James Grieve, M. D. | Glocester: | Printed by Raikes | for | T. Jefferys, Geographer to his Majesty, London. | M. DCC. LXIV. 4°. ll. 4, pp. i–vii, 1–280, 5 pll. and two maps.

Manati or Sea Cow, pp. 132–136. Whales, pp. 137–142.

Krasheninnikof's work is of special importance from its detailed account of the Sea Cow (*Rhytina borealis*), its habits, abundance, and products.

Grieve's version is a greatly abridged and condensed translation, but was the first and the only one prior to 1768, when a French translation direct from the original Russian appeared at Paris (*q. v.*), far superior to Grieve's. Of Grieve's abridged English version there appeared a German translation in 1766, by J. T. Kohler (Lemgo), a French, by M. E[idous] (Lyon), in 1767 (*q. v.*), and also, it is said, a Dutch (Amsterdam), in 1770. See especially *infrà*, KRASHENINNIKOF, at 1768. [292.]

1764. NOORDE, C. VAN. "Cagelot of potwalvis, gestrand by Egmond op Zee, 1764. Door *C. van Noorde.* br. folio."

From Bosgoed, *op. cit.*, p. 176, no. 2780. [293.]

1765. ANON. Lamantin. <*Encycl., ou Dict. des Sci., des Arts et des Métiers*, ix, 1765, p. 225. [294.]

1765. [Buffon, G. L. Leclerc, *Compte de, et* L. J. M. Daubenton]. Histoire | Naturelle, | Générale et Particuliére, | Avec la description | du Cabinet du Roi. | — | Tome Treizième. | — | [Vignette.] A Paris, | de L'Imprimerie Royale. | — | M. DCC. LXV. 4°. ll. 3, pp. i–xx, 1–441, l. 1, pll. i–lix.

Les Phoques, les Morses, et les Lamantins, pp. 330–441, pll. xliv–lix. Le Dugong, pp. 374–377 (par Buffon). Le Lamantin, pp. 377–394 (par Buffon). Description d'un embryon de Lamantin de la Guiane, pp. 425–430, pll. lvii–lix (par Daubenton). Description d'une tête de la Lamantin du Sénégal, pp. 431, 432 (par Daubenton). La tête d'un Dugon, pp. 437–440, pl. lvi (par Daubenton).

See later editions at 1792, 1802, and 1826. [295.]

1765. Cranz, David. David Cranz | Historie | von | Grønland | enthaltend | Die Beschreibung des Landes und | der Einwohner &c. | inbesondere | die | Geschichte | der dortigen | Mission | der | Evangelischen Brüder | zu | Neu-Herrnhut | und | Lichtenfels. | — | Mit acht Kupfertafeln und einem Register. | — | Barby bey Heinrich Detlef Ebers, und in Leipzig | in Commission bey Weidmanns Erben und Reich. | 1765. 8°. ll. 17, pp. 1–1132, ll. 13.

III. Abschnitt. Von den See-Thieren, pp. 140–160. **1.** Grønländische Wallfisch (=*Balæna mysticetus*), pp. 141–145; **2.** Nord-Caper (=*B. biscayensis*), p. 145; **3.** Finnfisch, p. 145; **4.** Jupiter-Fisch, p. 146; **5.** Pflok-Fisch, p. 146; **6.** Knoten-Fisch, p. 146; **7.** Einhorn-Fisch, oder Narhval, *Monoceros*, pp. 146–148; **8.** Säg-Fisch, *Pristis*, p. 148 (not a Cetacean); **9.** Caschelot oder Pottfisch, pp. 148–150; **10.** Weissfisch, p. 150; **11.** Butzkopf, p. 151; **12.** Meerschwein, p. 151; **13.** Delphin, p. 152; **14.** Schwerdtfisch (=*Orca*), p. 152; **15.** Eine andre Art Schwerdt-Fische, p. 152. Wallfisch-Fang, pp. 155–160.

Of the 15 species here distinguished 14 are Cetaceans, and nearly all are recognizably described. [296.]

1765. "Fermin, Ph. Histoire naturelle de la Hollande équinoxiale; ou description des animaux, plantes, fruits, etc., que se trouvent dans la colonie de Surinam; avec leurs noms différents, tant françois, que latins, hollandais, indiens et négre-anglais. Amsterdam, M. Magerus, 1765. gr. 8°."

Not seen; title from Bosgoed, *op. cit.*, p. 56, no. 872. [297.]

1766. Linné, C. Caroli a Linné, | . . . [=titles, 5 lines] | Systema | Naturæ | Per | Regna tria Naturæ, | Secundum | Classes, Ordines, | Genera, Species, | cum | Characteribus, Differentiis, | Synonymis, Locis. | Tomus I. | — | Editio Duodecima, Reformata | — | Cum Privilegio S:æ R:æ M:tis Sveciæ & Electoris Saxon. | — | Holmiæ, | Impensis Direct. Laurentii Salvii, | 1766. 8°. pp. 1–532.

II. *Bruta.> Sirenia. Trichecus Manatus*, pp. 49, 50 = *Manatus* et *Halicore*. Gen. *Trichecus* inter *Elephas et Bradypum* sistens spp. **1.** *T. Rosmarus*; **2.** *T. Manatus*.

VII. *Cete*, pp. 105–108. **1.** *Monodon Monoceros*; **2.** *Balæna Mysticetus*, p. 105; **3.** *Balæna Physalus*; **4.** *Balæna Boops*; **5.** *Balæna Musculus*, p. 106; **6.** *Physeter Catodon*; **7.** *Physeter macrocephalus*; **8.** *Physeter microps*; **9.** *Physeter Tursio*, p. 107; **10.** *Delphinus Phocæna*; **11.** *Delphinus Delphis*; **12.** *Delphinus Orca*, p. 108.

Genn. 4; spp. 12.

In the Vindobonæ reprint (1767), styled "Editio decima tertia, ad Editionem duodecimam reformatam Holmiensem," the pagination and matter relating to these groups is the same as here. [298.]

1767. "Beckmann, Joh. Anfangsgründe der Naturhistorie. 8°. Göttingin u. Bremen, 1767."

Not seen; title from Carus and Engelmann. Cited by Doundorff in connection with Cetaceans.

A new and improved edition, 8°, Breslau, 1813, is also mentioned. [299.]

1767. Cranz, David. The | History | of | Greenland: | containing | A Description | of | the Country, | and | Its Inhabitants: | and particularly, | A Relation of the Mission, carried on for above | these Thirty Years by the Unitas Fratrum, | at | New Herrnhuth and Lichtenfels, in that Country. | By David [Cranz] Crantz. | Translated from the High-Dutch, and illustrated with | Maps and other Copper-plates. | — | In two volumes. | — | Vol. I. | — | London, | Printed for the Brethren's Society for the Furtherance of the | Gospel among the Heathen: | And sold by J. Dodsley, in Pall-Mall; . . . [=names of seven

1767. CRANZ, DAVID—Continued.
other booksellers] and at | all the Brethren's Chapels. | MDCCLXVII. 8°. ll. 2, pp. i–lix, 1–405, 2 maps, pll. iii–vii; vol. ii, l. 1, pp. 1–498, pl. 2.

Of other singular Sea-Animals, i, pp. 106–122: **1.** The Greenland Whale, pp. 107–109 (avowedly from Martens and Zorgdrager), and pp. 118–121 (the Dutch Whale-fishery—"relation from the mouth of a Missionary"). **2.** The North-caper, p. 110. **3.** The Fin-fish, p. 110. **4.** The Jupiter-whale, p. 110. **5.** The Bunch, or Humpback-whale, p. 111. **6.** The Knotted-whale, p. 111. **7.** The Unicorn-fish, *monoceros*, also called *narhval*, pp. 111, 112. **8.** The Saw-fish, *pristis*, p. 112 (not a Cetacean). **9.** Cachelot, Catodon, or Pott-fisch, pp. 112–114. **10.** The White-fish, p. 114. **11.** The Grampus, p. 114. **12.** The Porpoise, pp. 114, 115. **13.** The Dolphin, called also Tumbler, p. 115. **14.** The Sword-fish (*Orca*), p. 115. **15.** Another kind of Sword-fish, the *ardluit* of the Greenlanders (*Orca*), pp. 115, 116. Whale-fishery of the Greenlanders, pp. 121, 122.

See above (1765. CRANZ, D.) for the first (German) edition. Also the following: [300.]

1767. CRANZ, D. "Historie van Groenland. Haarlem (or Amsterdam). 1767. 3 vols. 8°. pll. 12, 2 maps."

Dutch translation of the first German edition. The maps are said to be larger and better than in the German edition. A later Dutch edition appeared in 1786, *q. v.*

Not seen; abridged title from a bookseller's catalogue. [301.]

1767. [KRASHENINNIKOF, S. P.] Histoire | de | Kamtschatka, | des Isles Kurilski, | et des contrées voisines, | Publiée à Petersbourg, en Langue Russienne, par | ordre de Sa Majesté Impériale. | [Par Stepan Petrovitch Krasheninnikof.] On y a joint deux Cartes, l'une de Kamtschatka, & | l'autre des Isles Kurilski. | Traduite par M. E***. [Marc Antoine Eïdous.] | Tome premier [et second]. | [Design.] A Lyon, | Chez Benoit Duplain, Libraire rue | Merciere, à l'Aigle. | — | M. DCC. LXVII. | Avec Approbation & Privilege du Roi. 2 vols. 12°. Vol. i, ll. 4, pp. i–xv, 1–327, 1 map; vol. ii, ll. 4, pp. 1–359, 1 map.

Manati ou la vache marine, i, pp. 313–325. Baleines, ii, pp. 1–13.

This is merely a retranslation from Grieve, 1764, *q. v.* See, also, under 1768. [302.]

1768. "ADELUNG, JOH. CHR. Geschichte der Schiffahrten und Versuche welche zur Entdeckung des Nordöstlichen Weges nach Japan und China von verschiedenen Nationen unternommen worden. Zum Behufe der Erdbeschreibung und Naturgeschichte dieser Gegenden entworfen. Halle, bey Joh. J. Gebauer. 1768. 4°. Met 19 gegrav. platen en kaarten."

"Zie aldaar: Geschichte des Spitzbergischen Wallfischfanges. bl. 269–438."

Not seen; title from Bosgoed, *op. cit.*, p. 231, no. 3416. [303.]

1768. "EBERHARDT, JOH. PET. Versuch eines neuen Entwurfs der Thiergeschichte. Nebst ein. Anh. von einigen seltenen u. noch wenig beschrieb. Thieren. Mit 2 Kpfrtaf. 8°. Halle, 1768."

Not seen; title from Carus and Engelmann. [304.]

1768. KRASHENINNIKOF, [S. P.]. Voyage | en Sibérie, | contenant | la Description | du Kamtchatka, | ou l'on trouve | I. Les Mœurs & les Coutumes des Habitants du Kamtchatka. | II. La Géographie du Kamtchatka, & des Pays circonvoisins. | III. Les avantages & les désvantages du Kamtchatka. | IV. La réduction du Kamtchatka par les Russes, les révoltes arrivées en | différents temps, & l'état actuel des Forts de la Russie dans ce Pays. | Par M. Kracheninnikow, Professeur de l'Académie des Sciences | de Saint Pétersbourg. | Traduit du Russe. | Tome Seconde. | [Design.] A Paris, | Chez Debure, pere, Libraire, quai des Augustins, à Saint Paul. | — | M. DCC. LXVIII. | Avec Approbation, & Privilege du Roi. 4°. pp. i–xvi, 1–627, ll. 2, pll. i–xvii, maps i–vi.

"L'Ouvrage que l'on publie aujourd'hui, est dû à l'esprit éclairé de M. de * * *, & à son amour pour le travail: il l'a traduit à Saint Pétersbourg . . . "—*Avis de l'Éditeur*, p. x.

Des Vaches marines, pp. 446–454. De la Baleine, pp. 455–462.

A comparison of this work with Grieve's English translation, and the French translation from Grieve, shows at a glance that Grieve's rendering is greatly defective. All the plates and maps of the original, the editor tells us, are here reproduced, some of them, however, from new designs. The work forms vol. ii of the *Voyage en Siberie* of M. l'Abbé Chappe d'Auteroche, published by Debure at Paris in 1768.

1768. **Krasheninnikof**, [S. P.]—Continued.

Muller refers to a French edition published in two volumes at Amsterdam in 1770 as having been made directly from the Russian original. Is it other than a reprint of that of l'Abbé Chappe d'Auteroche? [305.]

1769. [**Bancroft, Edward.**] An | Essay | on the | Natural History | of | Guiana, | In South America. | Containing | A Description of many Curious Productions | in the Animal and Vegetable Systems | of that Country. | Together with an Account of | The Religion, Manners, and Customs | of several Tribes of its Indian Inhabitants. | Interspersed with | A Variety of Literary and Medical Observations. | In Several Letters | from | A Gentleman [Edward Bancroft] of the Medical Faculty, | During his Residence in that Country. | — | —Ad res pulcherrimas ex tenebris ad lucem erutas alieno | labore deducimur. | Seneca, De brevitate vitae, cap. xiv. | — | London, | Printed for T. Becket and P. A. De Hondt | in the Strand. MDCCLXIX. 8°. ll. 2, pp. i-iv, 1-402, l. 1.

Manatee or Sea-Cow, pp. 186-187. Original account. Of this work there is a German edition of same date (see next title), and also a Dutch translation from the English (Utrecht, 1782, 8°). [306.]

1769. **Bancroft**, E. Naturgeschichte | von | Guiana | in | Süd-Amerika. | worinn | von der natürlichen Beschaffenheit und den vor- | nehmsten Naturproducten des Landes, ingleichen der Re- | ligion, Sitten und Gebräuchen verschiedener Stämme | der wilden Landes-Einwohner, Nachricht | ertheilet wird. | — | In vier Briefen. | Von Eduard Bancroft, Esq. | — | Aus dem Englischen. | — | Ad res pulcherrimas ex tenebris ad lucem eruras | alieno labore deducimur. Seneca. | — | Frankfurt und Leipzig, | bey J. Dodsley und Compagnie, 1769. 8°. pp. i-x, l. 1, pp. 1-248.

Manati oder Meerkuh, pp. 112, 113. See last title. [307.]

1769. **Fermin**, P. Description | générale, historique, | géographique et physique | de la | Colonie de Surinam, | Contenant | Ce qu'il y a de plus Curieux & de plus Remarquable, tou- | chant sa Situation, ses Rivieres, ses Forteresses; son | Gouvernement & sa Police; avec les mœurs & les usa- | ges des Habitants Naturels du Païs, & des Européens | qui y sont établis; ainsi que des Eclaircissements sur l'œ- | conomie générale des Esclaves Negres, sur les Planta- | tions & leurs Produits, les Arbres Fruitiers, les Plan- | tes Médécinales, & toutes les diverses Especes d'animaux | qu'on y trouve, &c. | Enrichie de Figures, & d'une Carte | Topographique du Païs. | Par | Philippe Fermin, | Docteur en Médecine. | Tome Premier [et second]. | [Design.] A Amsterdam, | Chez E. van Harrevelt. | MDCCLXIX. 2 vols. 8°. Map and plates. Vol. i, pp. i-xxiv, 1-252, map; vol. ii, ll. 2, pp. 1-352, pll. 3.

De l'Ichthyologie, ou Description des Poissons, vol. ii, chap. xxii, pp. 248-281. Le Marsouin, pp. 250, 251.

The second volume of this work is largely zoölogical, but the only passage strictly citable in the present connection is that above given. In the chapter "Des Quadrupedes" (vol. ii, chap. xix, pp. 88-140) are two pages (*l. c.*, pp. 122-124) on the "Veau marin," in which the author evidently describes the Common Seal (*Phoca vitulina*), in which he says: "Tel est le *Veau Marin*, qu'on appelle improprement, dans le pays, *Zee-Hond* ou *Zee-Kou.*" This seems to be a confused reference to the Manatee, or Sea-Cow, and, strangely, the only one in the work. The author also describes "Buffles" (*l. c.*, pp. 89, 90) as inhabitants of the country. These two facts seem to show that the author's zoölogical matter is not wholly trustworthy. Yet Sabin cites Rich as saying: "One of the best books *at the time it was written* in regard to the colonies," which, doubtless, in other respects, may be true enough. [308.]

1769. S., J. A. "Stradavits Reyse ter Walvis-Vangst, rijmsgewijze beschreven door J. A. S. Chirurgijn op het schip Zaandijker Hoop. Antwerpen, P. J. Parys. 1769. 4°."

"Curious and rare." Not seen; title at second hand. [309.]

1769-92. "**Porte, de la.** De nieuwe Reisiger: of Beschryving van de oude en nieuwe werelt. Uit het Fransch. Te Dordrecht, bij Abr. Blussé en zn. 1769-1792, 32 dln. gr. 8°."

"De walvisch en de walvischvangst, viii, pp. 213-218 enz."

Not seen; title and reference from Bosgoed, *op. cit.*, p. 246, no. 3545. [310.]

1770. **Cranz, David.** David Cranz | Historie | von | Grönland | enthaltend | Die Beschreibung des Landes und | der Einwohner etc. | inbesondere | die | Geschichte | der dortigen | Mission | der | Evangelischen Brüder | zu | Neu-Herrnhut | und | Lichtenfels. | — | Zweyte Auflage. | — | Mit acht Kupfertafeln und ein Register. | — | Barby bey Heinrich Detlef Ebers, | und in Leipzig | in Commission bey Weidmanns Erben und Reich. | 1770. 3 Theilen. 8°. Th. i, ll. 19, pp. 5–512.

Von den See-Thieren, Th. i, pp. 140–160. For further remarks in relation to cetological matter, see orig. ed., 1765, and the English ed. of 1767. [311.]

1770. "**Janssen, Jac.** Merkwürdige Reise, welcher mit dem Schiffe die Frau Elisabeth den 7^{ten} April nach Grönland auf den Wallfischfang gegangen, etc. Hamburg, 1770. 4°. Met een plaat."

"Hiervan een kort Verslag in: *Lindeman*, Arktische Fischerei, bl. 46–48."

Not seen; from Bosgoed, *op. cit.*, p. 239, no. 3487. [312.]

1770. "**Janssen, Jac.** Verhaal der merkwaardige reize met het schip: de vrouw Maria Elizabeth, den 7 April 1769, van Hamburg naar Groenland ter walvischvangst uitgezeild, tot den 20 Nov. in het ijs bezet geweest, den 21^{sten} dier maand daaruit geraakt en den 13 Dec. derzelfden jaars gelukkig weder te Hamburg aangekomen. Uit het Hoogd. vertaald. Haarlem, 1770. 4°. 24 bladz. Meet eene plaat."

Not seen; from Bosgoed, *op. cit.*, p. 239, no. 3488. Apparently a translation of the work last above cited. [313.]

1770. "**Pietersz., Fr.** Omstandig journaal of reysbeschrijving op het schip 'De vrouw Maria,' gedestineerd ter walvischvangst na Groenland, in den jaare 1769. (Amsterdam), K. van Rijschooten. (1770.) 4°."

Not seen; title from Bosgoed, *op. cit.*, p. 245, no. 3538. [314.]

1770. "**Sante, G. van.** Alphabetische naamlijst van alle de Groenlandsche en Straat-Davissche commandeurs, die sedert het jaar 1700 op Groenland en sedert het jaar 1719, op de Straat Davis voor Holland en andere provinciën hebben gevaren. Waarin men met eenen opslag kan zien, hoeveel visschen, vaten spek en quardeelen traan yder commandeur uit Groenland en uit de straat Davis heeft aangebragt en voor wat Directeurs dezelven hebben gevaren. Haarlem, J. Enschedé, 1770. Met titelplaat. 4°."

"Dit exempl. is met de pen bijgewerkt tot het jaar 1802."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 247, no. 3550.

There appears to have been a much earlier (anonymous?) edition of the "Naamlijst" (4°, Zaandam, 1753, *q. v.*).

Scoresby observes that this work, "notwithstanding the unpromising title, is in reality an instructive work. It is from it, indeed, that the most interesting details of the success of the Dutch fishery during a period of more than a century, included between 1669 and 1779, are derived."—*Arctic Regions*, ii, p. 155. [315.]

1771. **Forster, J. R.** A | Catalogue | of the | Animals | of | North America | Containing, | An Enumeration of the known Quadrupeds, Birds, | Reptiles, Fish, Insects, Crustaceous and | Testaceous Animals; many of which are New, and | never described before. | To which are added, | Short Directions | for Collecting, Preserving, and Transporting, | all Kinds of | Natural History Curiosities. | By John Reinhold Forster, F. A. S. | — | . . . [Motto.] | — | London: | Sold by B. White, at Horace's Head, in Fleet-Street. | — | M.DCC.LXXI. 8°. pp. 43. Frontispiece, pl. of *Falco sparverius*, Linn.

Classis iv. Fish. Section i. Cetaceous. A nominal list of 9 spp., under English names. [316.]

1771. **Forster, J. R.** *See* **Osbeck, Peter**, 1771. [317.]

1771. **Osbeck, Peter.** A | Voyage | to | China and the East Indies, | By Peter Osbeck, | Rector of Hasloef and Woxtorp, | Member of the Academy of Stockholm, and of the | Society of Upsal. | Together with a Voyage to Suratte, | By Olof Toreen, | Chaplain of the Gothic Lion East Indiaman. | And | An Account of the Chinese Husbandry, | By Captain Charles Gustavus Eckeberg. | Translated from the German, | By John Reinhold Forster, F. A. S. | To which

1771. **Osbeck, Peter**—Continued.
are added, | A Faunula and Flora Sinensis. | In two Volumes. | Vol. I [-II]. | London, | Printed for Benjamin White, | at Horace's Head, in Fleet-street. | M DCC LXXI. 8°.

"Snow-White *Dolphins* (*Delphinus Chinensis*) tumbled about the ship; but at a distance they seemed in nothing different from the common species, except in the white colour" (vol. ii, p. 27).

Under the name *Delphinus Orca* (vol. i, p. 7) is a quotation from Egede in reference to the "Northcaper"! [318.]

1771. [**Pennant, T.**] Synopsis | of | Quadrupeds | [By Thomas Pennant.] [Vignette.] Chester | Printed by J. Monk | MDCCLXXI. | M. Griffith Del^{t}. R. Murray Sc^{t}. [Engraved title-page.] 8°. pp. i-xxv, 1-382, pl. i-xxxi+xiii bis.

The author's name does not appear on the title-page, but the "Preface" is signed "Thomas Pennant, Downing, March 20, 1771."

Manati, pp. 351-358. A general account of the Sirenians as then known, which were thought to constitute a single species. Pennant's references are here, however, mainly to Steller's Sea-Cow and the American Manatee. There is also reference to the "Sea Ape" and the "Beluga," the account of which, as here given, is a curious mixture of truth and fiction. [319.]

1771. **Robertson, J.** Description of the blunt-headed *Cachalot*. <*Philos. Trans. Lond.*, lx, art. xxvii, 1771, pp. 321-324, 1 pl.

The plate represents the animal, the head, and the head in transverse section of "*Physeter Catodon Linnaei*" = *Physeter macrocephalus*. [320.]

1771. "**Trampler, J. C.** Umständliche Beschreibung des Grönländischen Walfischfanges, ingleichen von den Ursachen und Eigenschaften des Nordlichts. Leipzig, Müller, 1771. 8°."

Not seen; title from Bosgoed, *op. cit.*, p. 248, no. 3570. [321.]

1773. **Bonannio, P. P.** Rervm Natvralivm | Historia | nempe | Qvadrvpedvm Insectorvm Piscivm variorumqve marinorvm | Corporvm fossilivm Plantarvm exoticarvm | ac praesertim | Testaceorvm | exsistentivm | in Mvseo Kircheriano | edita iam | A P. Philippo Bonannio | nvnc vero nova methodo distribvta notis illvstrata | in tabvlis reformata novisqve observationibvs locvpletata | a Iohanne Antonio Battarra Ariminiensi | Philosophiae Professore. | Pars Prima [et Segvnda] | [Vignette.] Romae MDCCLXXIII. | In typographio Zempelliano | Aère Venantii Monaldini Bibliopolae. | — | Praesidvm Facvltate. 2°. pp. i-xl, 1-260, pll. i-xlvii.

Piscis generis Cetacei, quem *Capodoglio* Itali appellant [= *Physeter macrocephalus*], i, pp. 157, 158, pl. xxxviii, figg. 34 (anim.), 35 (mand. infer.), 36 (vertebra). Description, with measurements, and an original figure of a Cachalot 48 feet long, taken in the Mediterranean 18 April, 1715. [322.]

1773. **Müller, P. L. S.** Des | Ritters Carl von Linné | Königlich Schwedischen, Leibarztes etc. etc. | vollständiges | Natursystem | nach der | zwölften lateinischen Ausgabe | und nach Anleitung | des holländischen Houttuynischen Werks | mit einer ausführlichen | Erklärung | ausgefertiget | von | Philipp Ludwig Statius Müller | Prof. der Naturgeschichte zu Erlang und Mitglied der Röm. Kais. | Akademie der Naturforscher etc. | Erster Theil. | Von den | säugenden Thieren. | — | Mit 32. Kupfern. | — | Nürnberg, | bey Gabriel Nicolaus Raspe, 1773. 8°. ll. 11, pp. 1-508, ll. 7, pll. i-xxxii.

II. Ordnung. Bruta.> *Trichecus Manatus*, pp. 174-176. Tab. xxix, fig. 3.

VII. Ordnung. Wallfischartige oder säugende Seethiere. *Cete.* **1.** *Monodon Monoceros*, p. 477; **2.** *Balæna Mysticetus*, p. 481; **3.** *Balæna Physalus*, p. 491; **4.** *Balæna Boops*, p. 492; **5.** *Balæna Musculus*, p. 492; **6.** *Physeter Katodon*, p. 497; **7.** *Physeter Macrocephalus*, p. 498; **8.** *Physeter Microps*, p. 501; **9.** *Physeter Tursio*, p. 503; **10.** *Delphinus Phocæna*, p. 504; **11.** *Delphinus Delphis*, p. 505; **12.** *Delphinus Orca*, p. 506. Auch der Pflockfisch, p. 493; der Knotenfisch, p. 493; der Nordkaper, p. 494; der Säbelfisch (Epée de Mer), p. 507; der Mörder (Killer), p. 507; der Blaser (Souffleur), p. 508. [323.]

1773. **Piscator, Lubertus.** "Brief van Lubertus Piscator over de visscherij, die bij een loterij vergeleken wordt.—Oorzaaken van derzelver afneemen.—Wederlegging.—Middelen ter verbetering op de Walvischvangst."

"Zie: De Koopman of bijdr. ter opbouw van Neêrlands koophandel en zeevaard. Amst.; 1773, iv. No. 5, 12, 13, 25, 26."

Not seen; from Bosgoed, *op. cit.*, p. 250, no. 3588. [324.]

1773. **SIBBALD, ROBERT.** Phalainologia nova; | sive | Observationes | de | rarioribus quibusdam Balænis | In Scotiæ Littus nuper ejectis: | in quibus, | nuper conspectæ Balænæ per Genera & | Species, secundum Characteres ab ipsa | Naturâ impressos, distribuuntur; | quædam nunc primum describuntur; errores etiam | circa descriptas deteguntur; & breves de Dentium, | Spermatis Ceti, & Ambræ Griseæ ortu, naturâ & | usu, dissertationes traduntur. | [By Sir Robert Sibbald. Edited by Thomas Pennant.] — |

Mirac'lum ponti narrant ingentia Cete |
Viribus invictis, & vasta mole moventur. |
In littus pauca exiliunt, quæ corpore vasto |
Sunt.— | Oppianus de Pisc. lib. I. | — |

Edinburgi, | Typis Joannis Redi, M DC XCII. | Veneunt apud M. Robertum Edward, verbi divini ministrum, in | vico dicto, The Bishop's Land Closs. | Iterum impressi, Londini, | Apud Benj. White, in Vico Fleet-Street. MDCCLXXIII. 8°. ll. 2, p. 1–105, tabb. 1–3.

Observationes de Balænis quibusdam in Scotiæ Littus nuper ejectis. Præfatio. De Balænis in Genere, pp. 7–14. Sectio prima. De Balænis, quæ Dentes in Ore habent, minoribus. Præfatio de Dentatis in Genere, pp. 15–17. Caput i. De Balænis Minoribus in utrâque Maxillâ Dentatis, quæ Orcæ vocantur, pp. 17–24. Caput ii. De Balænis Minoribus in Inferiore Maxillâ tantum Dentatis, sine Pinnâ aut Spinâ in Dorso, pp. 24, 25. Caput iii. De Balænis omnium Minimis, incertæ Classis, pp. 25, 26. Sectio secunda. De Balænis Majoribus, in Inferiore Maxillâ tantum Dentatis. Præfatio de hujusmodi Balænis in genere, pp. 27–30. Caput i. De Balæna Macrocephalâ quæ Binas tantum Pinnas Laterales habet, pp. 30–33. Caput ii. De Balænâ Macrocephala, quæ Tertiam in Dorso Pinnam sive Spinam habet, & dentes in Maxilla inferiore Arcuatos Falciformis, pp. 33–43. Caput iii. De Balæna Macrocephala Tripinni, quæ in mandibulâ inferiore dentes habet minus inflexos, & in planum desinentes, pp. 43–45. Caput iv. De Spermate Ceti, pp. 45–52. Caput v. De oleo quod ex his Belluis paratur, pp. 52–54. Caput vi. De Dentibus harum Balænarum, pp. 54–57. Sectio iii. De Balænis Majoribus Laminas Corneas in Superiore Maxillâ habentibus. Præfatio. De hujusmodi Belluis in genere, pp. 58–64. Caput i. De Balænis hujusmodi Bipinnibus, tam quæ carent fistulâ, quam quæ eam habent, pp. 64–66. Caput ii. De Balænis Tripinnibus, quæ nares habent, in genere, pp. 67–68. Caput iii. De Balænâ hujusmodi Tripinni quæ rostrum acutum habet, & plicas in Ventre, pp. 68–78. Caput iv. De Balænâ Tripinni quæ maxillam inferiorem rotundam, & superiore multo latiorem habuit, pp. 78–84. Caput v. De Balæna hujusmodi prægrandi in littus Boênæ nuper ejecta, pp. 84, 85. Caput vi. De laminis corneis, de plicis, & de oleo hujusmodi Belluarum, pp. 85–93. Appendix. De iis quæ Balænis communia sunt. Præfatio, pp. 94, 95. Caput i. De Pinguedine Balænarum, p. 96. Caput ii. De Carne harum Belluarum, p. 97. Caput iii. De Balænarum priapo, p. 97. Caput iv. De Ambrâ Griseâ, pp. 98–104. Caput ultimum. De tempore quo Balænæ maxime conspiciuntur, pp. 104, 105.

Tab. 1. Balæna Macrocephala. Balæna cum laminis corneis in ore. Vertebræ caudæ, etc.

Tab. 2. Lamina cornea cum pilis. Dens Orcæ. Dens Balænæ Macrocephalæ Orcadensis. Dens Macrocephalæ falciformis, etc.

Tab. 3. Balæna tripinnis maxilla inferiore rotunda.

Plate i, upper figure, is a very faulty representation of *Physeter macrocephalus*, the blowhole being at the posterior part of the head and the upper jaw rather small and pointed. Plate i, lower figure, is a better representation of a Finner Whale, probably *Balænoptera rostrata*. Plate ii, fig. of a blade of baleen of a Finner whale, of a much worn tooth, and a young tooth of *Physeter macrocephalus*, etc. Plate iii, probably *Physalus antiquorum*.

The *editio princeps* of Sibbald's "Phalainologia" (which I have been unable to see) appeared in 1692 (4°, Edinburgh). The early systematists trusted implicitly in Sibbald, who unfortunately described different examples of the common Cachalot as different species, resulting in the introduction into systematic zoölogy of several nominal species, which were not effectually weeded out till comparatively late in the present century. The confusion resulting from Sibbald's work may be considered as more than balancing the much really new information he contributed to the subject. This is perhaps less his fault than that of later compilers, who knew too little of the subject of which he wrote to have any power of discrimination, or even, in some cases, to understand the author whom they blindly followed. (*Cf.* Eschricht, "Recent Memoirs on the Cetacea," Ray Soc., 1866, pp. 161–163.) [325.]

1774. **ANON.** The | Journal of a Voyage | undertaken by order of | His present Majesty, | For making Discoveries towards the | North Pole, | by the | Hon. Commodore Phipps, | and | Captain Lutwidge, | in His | Majesty's Sloops | Racehorse and Carcase. | To which is prefixed, | An Account of the several

1774. Anon.—Continued.

Voyages undertaken for | the Discovery of a North-east Passage to China | and Japan. | — | London: | Printed for F. Newbery, at the Corner of St. Paul's | Church Yard. | — | MDCCLXXIV. 8°. l. 1, pp. i–xxviii, 29–118.

The author's name is not given, but the work was apparently written by an officer of the expedition.

Smearingburgh harbour [Spitzbergen], p. 45. "A View of the Whale-fishery," pl. facing p. 81. There are, however, only a few incidental and unimportant allusions to the Whale-fishery in the text. [326.]

1774. "Hoogerduin, Dirk Cornelisse. Singulieren of byzonderen Historiën wegens het verongelukken van het Groenlands Schip, de jufvrouwen Anna Cornelia en Anna, waarop commandeerde D. C. Hoogerduin van de Helder, gedestineerd na Groenland ter Wallevisvangst, met 45 zielen uit Texel gevaeren; in het gepasseerde jaer 1773 op den 8 April en na een fatigante Rys te hebben gehad, hetzelve schip op de te Huisrys, na alvorens duizende van gevaere te hebbe ondergaen, eindelijk met drie sloepen op den 21 Aug. deszelfs jaers op Egmond gestrand, waervan 29 man op een wonderbaerlijke wys het leven hebben behouden en de rest verdronken; vervult met zeltzame en byna nooit gehoorde gevallen. Amsterdam, W. A. Leeuwendaal. 1774. 4°."

Not seen; from Bosgoed, *op cit.*, p. 238, no. 3479. [327.]

1774. Höpsch, *Baron von.* Beschreibung einiger neuentdeckten versteinten Theile grosser Seethiere. <*Der Naturforscher*, iii, 1774, pp. 178–183.

Ueber Gehörknochen und andere Knochen der Seekuh und einige Knochen von Walfischen bei Antwerpen entdeckt. [328.]

1774. Oexmelin, A. O. [=Exquemelin, A. O.] Histoire | des | Adventuriers | Flibustiers | qui se sont signalés dans les Indes; | Contenant ce qu'ils y ont fait de remarquable, | avec la vie, les mœurs & les coutumes des Bou- | caniers, & des habitans de S. Domingue & de | la Tortuë; une description exacte de ces lieux, | & un état des Offices, tant Ecclésiastiques que | Séculiers, & ce que les grands Princes de | l'Europe y possédent. | Par Alexandre-Olivier Oexmelin. | Nouvelle Edition, | Corrigée & augmentée de l'Histoire des Pi- | rates Anglois, depuis leur établissement dans | l'Isle de la Providence jusqu'à present. | Tome Premier [-Quatriéme]. | [Design.] A Lyon, | Chez Benoit & Joseph Duplain, | Pere & Fils. | — | Avec Privilege du Roi. | M. DCC. LXXIV. 4 vols. 12°. Vol. i, ll. 6, pp. 1–394, l. 1.

Anatomie du Lamentin, i, pp. 372–376.

This edition is textually the same as that of 1744, *q. v.*, and appears to be identical with that given by Sabin as published in 1775. [329.]

1774. Phipps, C. J. A | Voyage | towards | the North Pole | undertaken | by His Majesty's Command | 1773 | — | By Constantine John Phipps | — | London; Printed by W. Bowyer and J. Nichols, | for J. Nourse, Bookseller to His Majesty, | in the Strand. | MDCCLXXIV. 4°. pp. i–viii, 1–253, l. 1, pll. i–xiv.

Mammalia, App., pp. 183–186.—*Balæna mysticetus*, p. 185; *Balæna physalus*, p. 184. There is a short account of Smeerenberg, pp. 68, 69. The cetological matter is unimportant.

There is a French translation (Paris, 4°, 1775, *q. v.*), and a German (Berne, 4°, 1777, *q. v.*). [330.]

1774. "Wijbo, J. Canzius. Dissertatio de balaenarum piscatu. Lugd. Bat. 1774. 4°."

Not seen; title from Bosgoed, *op. cit.*, p. 253, no. 3609. [331.]

1774–75. Olafsen, Eggert. Des | Bice-Lamands Eggert Olafsens | und des | Landphysici Biarne Povelsens | Reise durch Island, | veranstaltet | von der Königlichen Societät der Wissenschaften | in Kopenhagen | und beschrieben | von bemeldtem Eggert Olafsen. | — | Aus dem Danischen übersetzt. | — | Mit 25 Kupfertafeln und einer neuen Charte über Island | versehen. | — | Erster Theil. | — | Kopenhagen und Leipzig, | bey Heinecke und Faber. | 1774. 4°. Erster Theil, ll. 8, pp. 1–328, pll. i–xxv, und Charte; zweiter Theil, 1775, pp. i–xvi, 1–244, pll. xxvi–l.

Wallfische, Th. i, p. 35, § 90; Vom Wallfische, Th. i, pp. 287–291, §§ 657–663; Wallfische, Th. ii, p. 200, § 895. [332.]

1775. **Phipps, C. J.** Voyage | au Pole Boréal, | fait en 1773, | par ordre du Roi d'Angleterre, | par Constantin-Jean Phipps. | Traduit de l'Anglois. | [Design.] A Paris, |

Chez { Saillant & Nyon, rue Saint Jean de Beauvais.
Pissot, Quai des Augustins, près la rue Git-le-Cœur. |

— | M.DCC.LXXV. | Avec Approbation et Privilége du Roi. 4°. pp. i–xij, 1–257, l. 1, pll. and maps.

Mammifères du Spitsberg, pp. 187–190.—*Balæna mysticetus*, *Balæna physalus*, p. 190. [333.]

1775. [**Stauning, Jorgen.**] Kort | Beskrivelse | over | Grønland. | [Af Jorgen Stauning.] | [Vignette.] — | Biborg, 1775. | Trykt udi det Kongelige privilegerede Bogtrykkerie | ved C. H. Maugor. 8°. ll. 7, pp. 1–328, l. 1.

Fierde Kapitel, Om See Dyrene, pp. 121–140, contains an account of the *Cetacea*. **1.** Grønlandske Hvalfisk, pp. 124–129 = *Balæna mysticetus*; **2.** Nordkapper, et Slags Hval, p. 129 =? *B. biscayensis*; **3.** Finfisken, p. 129 = *Physalus antiquorum*; **4.** Jupiterfisk eller rettere Gurbartas eller Gibbar, p. 130 = *Balænoptera jubartes* et *gibbar*, Lecépède, etc., hence probably *Physalus antiquorum*; **5.** Flogfisk, p. 130 = *Megaptera longimana*; **6.** Knudefisk, p. 130 =? *Balænoptera rostrata*; **7.** Eenhiørning eller Narhval, Monoceros, p. 131; **8.** Snabelfisk, p. 132 =? [af Grønlænderne kaldes den Sigukitsok; *cf.* Fabricius, *Faun. Groenl.*, p. 52]; **9.** Kaschelot eller Potfisk, p. 133 = *Physeter macrocephalus*; **10.** Hvidfisk, p. 134 =? *Beluga catodon*; **11.** Butskopper, p. 135 =? *Orca gladiator*; **12.** Marsviin, p. 136 = *Phocæna communis*; **13.** Delphin, p. 137 = *Delphinus delphis*; **14.** Sværdfisk, p. 137 = *Orca gladiator*. [334.]

1775. **Valmont de Bomare.** Baleine, *balæna*. <*Dict. rais. universel d'Histoire nat.*, i, 1775, pp. 438–463 (8° éd., 1775).

"On ne s'attachera ici, suivant le plan qu'on s'est proposé; qu'à jeter un coup d'œil général sur les especes de baleines les plus curieuse, & sur celles dont on retire le plus d'utilité. On ne peut rien faire de mieux que de parler d'après le curieux *Anderson*, ainsi que l'ont fait tous ceux qui, depuis lui, ont traité des baleines" (pp. 438–439). The Baleines are termed "faux poisson de mer."

General history, under vernacular names, of the species then known. Baleine de Groënland, pp. 441–446; Licorne de mer, ou Narhwal, pp. 446–448; Cachalot, ou la petite Baleine, pp. 448–452; Pêche des Baleines, pp. 455–456; Ennemis des Baleines, p. 456; Épée de mer de Groënland, ou Poisson Empereur, p. 457; Espadon ou Poisson à scie, p. 458; Marsouin ou Souffleur, p. 459; Dauphin, p. 460; Autres especes de Baleines, p. 462.

Note.—The *Sirenia* are treated in the article "Vache marine," tom. ix, p. 178, the Dugong being the only species recognized, under which is included the African Manatee as well as the American Manatee. "Le *dugon* est une fausse espece de morse de la mer de l'Afrique & des Indes Orientales. . . ."

There is an earlier (1764) ed. of Bomare not seen by me. [335.]

1776. **Anon.** Pêche de la Baleine. <*Suppl. à l'Encycl. ou Dict. rais. des Sci., des Arts et des Métiers*, i, 1776, pp. 763, 764. [336.]

1776. [**Fabricius, O.**] <*Mülleri Zoologiæ Danicæ Prodromus*, 1776, pp. viii, ix.

Cetacea, p. viii, *Balæna Boops* (= Icelandic, *Hrafu-Reydur*; Greenlandic, *Keporkak*); *Physeter tursio* (= *Balæna albicans*, Klein; Greenlandic, *Pernak*).

"Sequentia animalia, quæ impressis jam primis libelli paginis, suppeditabat venerabilis Otho Fabricius," etc., p. viii. [337.]

1776. **Müller, O. F.** Zoologiæ Danicæ | Prodromus, | seu | Animalium | Daniæ et Norvegiæ indigenarum | characteres, nomina, | et | synonyma imprimis popularium. | Auctore | Othone Friderico Müller, | . . . [= titles, 3 lines]. — | Impensis Auctoris. | — | Havniæ, | Typis Hallageriis. | CIↃ DCC LXXVI. 8°. pp. i–xxxii, 1–282.

Cete, pp. 6–8, spp. 44–57 = 14 spp. **1.** *Monodon Monoceros*, p. 6; **2.** *Balæna Mysticetus*, p. 6; **3.** *B. Physalus*, p. 7; **4.** *B. Musculus*, p. 7; **5.** *B. rostrata*, p. 7; **6.** *B. glacialis*, p. 7; **7.** *B. albicans*, p. 7; **8.** *Physeter Catodon*, p. 7; **9.** *Ph. macrocephalus*, p. 7; **10.** *Ph. microps*, p. 7; **11.** *Delphinus Phocæna*, p. 7; **12.** *D. Delphis*, p. 7; **13.** *D. Orca*, p. 8; **14.** *D. Orca* [^{bis}]. [338.]

1776. [**Pennant, Thomas.**] British Zoology. | Vol. III. | Class III, Reptiles. | IV, Fish. | — | Warrington: | Printed by William Eyres, | for Benjamin White, at Horace's Head, | Fleet-Street, London. | MDCCLXXVI. 8°. ll. 4, pp. 1–425, ll. 3, pll. i–xii, xii*–lxxiii.

1776. [Pennant, Thomas]—Continued.

Div. I. Cetaceous Fish = Cetacea, pp. 47–74, spp. 16–26 = 11 spp. **1.** Common Whale, p. 50 = *Balæna mysticetus*; **2.** Pike-headed Whale, p. 56 = ? *Physalus antiquorum*; **3.** Fin Fish, p. 57 = ? *Physalus antiquorum*; **4.** Round-lipped Whale, p. 58 = ? *Physalus antiquorum*; **5.** Beaked Whale, p. 59, pl. v, fig. 1 = *Hyperoodon bidens*; **6.** Blunt-headed Cachalot, p. 61, pl. vi, animal from Robertson = *Physeter macrocephalus*; **7.** Round-headed Cachalot, p. 63, pl. vii, fig. 22, tooth; **8.** High-finned Cachalot, p. 63 = *Physeter macrocephalus*; **9.** Dolphin, p. 65 = *Delphinus delphis*; **10.** Porpesse, p. 69 = *Phocæna communis*; **11.** Grampus, p. 72 = *Orca gladiator*.

The references to the plates in the text do not correspond with the numeration on the plates. [339.]

1776. ———. "Artikler hvorefter Commendeurerne og Mandskabet paa Skibene, der udsendes for den Gronlandske Handel og Fiskefangst, skulle rette sig (1776). (Reglementen waarnaar de Kommandeurs zich te gedragen hebben.)"

Not seen; title from Bosgoed, *l. c.*, p. 232, no. 3421. [340.]

1777. Erxleben, J. C. P. Io[hannus]. Christ[ianus]. Polyc[arpus]. Erxleben | . . . [=titles, 5 lines] | Systema | Regni Animalis | per | Classes, Ordines, Genera, | Species, Varietates | cvm | Synonymia et Historia Animalivm. | — | Classis I | Mammalia. | [Vignette.] | — | Lipsiæ | Impensis | Weygandianis. | MDCCLXXVII. 8°. pp. i–xlviii, 1–636, ll. 32, unpaged. Preface dated Goettingae, mense Nouembri, CIↃIↃCCLXXVI = 1776.

Collation: Dedicatio ad Georgio III, pp. iii–vi; Praefatio, pp. vii–x; Catalogus voluminum eorumque editionem quibus vsus sum, pp. xi–xxviii; Synopses et diagnoses generum, pp. xxix–xlviii; Species, pp. 1–628; Additamenta, pp. 629–631; Nomina Hvngarica mammalivm, pp. 632–636; Index generum, 1 p. + 3 ll. unnumbered; Index synonymorvm, 28 ll. unpaged; Index synonymorvm Graecorvm, et Index synonymorvm Rvssicorvm, 8 ll. unpaged; Errata, 1 p.

Trichechus (= *Sirenia* + Walruses), pp. 593–600. **1.** *T. Rosmarus*, pp. 593–596; **2.** *T. Manatus*, pp. 596–599 (= genn. *Manatus* et *Rhytina*); **3.** *T. Dugung*, p. 599. Species obscuræ (= Bieluga, Steller, et Sea Ape, Pennant = sp. fict.), pp. 599, 600.

[*Cetacea*], pp. 601–628; genera 48–51 = 4; spp. 13, to wit: **1.** *Balæna Mysticetus*, pp. 601–605; **2.** *B. Physalus*, 605–607; **3.** *B. Boops*, pp. 608, 609; **4.** *B. Musculus*, pp. 609, 610; **5.** *B. gibbosa*, pp. 610, 611; Species obscura, p. 611; **6.** *Physeter Catodon*, pp. 611, 612; **7.** *P. macrocephalus*, pp. 612–614; **8.** *P. microps*, pp. 614, 615; **9.** *P. Tursio*, pp. 615, 616; Species obscuræ (= *Beluga catodon*; *Physeter macrocephalus* = Spermaceti Whale of Dudley; Anderson's Second species of Cachalot = *Physeter macrocephalus*), pp. 616, 618; **10.** *Delphinus Phocæna*, pp. 618–621; **11.** *D. Delphis*, pp. 621–623; **12.** *D. Orca*, pp. 623–626; **13.** *Monodon Monoceros*, pp. 626–628.

Balæna gibbosa, p. 610, sp. n.; not Scrag Whale, Dudley, as usually stated, which is one of the "Species obscuræ" not formally recognized, although some of the synonyms cited under *B. gibbosa* may cover Dudley's Scrag Whale, which Erxleben cites (or the species based on it) at p. 607, at the end of his account of his *Balæna physalus*.

The author very justly observes: "Cetorum species pauciores recte cognitae: videtur horum historia denuo fere inchoanda" (p. 601). His treatment of the subject is judicious, being superior, perhaps, to that of any other systematist of the eighteenth century. While still retaining a few species proved later to be merely nominal, he relegated to the list of "Species obscuræ" several which had been currently recognized by previous compilers. [341.]

1777. "Hermann, Joa. Tabula affinitatum animalium; brevi commentario illustrata. 4°. Argentorati, 1777."

Not seen; title from Carus and Engelmann. [342.]

1777. Phipps, C. J. Reise | nach dem Nordpol. | Auf Befehl Ihro Kônigl. Grossbrittannischen Majestât. | Unternommen im Jahr 1773. | Von C. J. Phipps, | aus dem Englischen, | Mit | Zusâtzen und Anmerkungen von Herrn Landvogt [Samuel] Engel. | — | Mit Kupfern. | — | [Design.] Bern, | — | bey der typographischen Gesellschaft 1777. | 4°. ll. 3, pp. i–x; l. 1, pp. 1–122; ll. 2, pp. 1–304; l. 1, maps and pll.

Mammalia [of Spitzbergen], pp. 95–97. **1.** *Balæna mysticetus*; **2.** *Balæna physalus*, p. 97. [343.]

1777. Scopoli, J. A. Ioannis Ant. Scopoli | Philos. et Med. Doct. Caesareae Regiaeqve | Maiestatis a consiliis in rebvs metallicis, | chemiae ac botanices Professoris in | regio archigymnasio Ticinensi &c. | Introdvctio | ad | Historiam | Natvralem | sistens | genera | Lapidvm, Plantarvm, | et | Animalivm | hac-

1777. SCOPOLI, J. A.—Continued.
tenvs detecta, | caracteribvs essentialibvs donata, | in tribvs divisa, | svbinde ad leges natvrae. | [Vignette.] | — | Sur un plan nouveau, toutes connoissances anciennes | & nouvelles. Adanson. | — | Pragae | Apvd Wolfgangvm Gerle, Bibliopolam. | MDCCLXXVII. 8°. ll. 5, pp. 1–506, ll. 17.

Tribus xii, Kleinii (Mammalia). Gens i, *Cetacea*, p. 486, [genera] 428–431, viz: *Balena* (=*Mysticete* auct. mod.), *Physeter*, *Monodon*, *Delphinvs*. Gens ii. *Quadrvpedia*. Divisio i, *Aqvatilia*.—[Genus] 432. *Manatvs*, Rondelet, p. 490. [344.]

1778. ANON. "Echt historisch Verhaal zo uit de mond als pen, van drie zeelieden, wegens het verongelukken van het schip, de Wilhelmina van de Helder, alsook de noodlottige en droevige ongelukken van nog negen andere schepen, dewelke alle verongelukt zijn in Groenland, door de bezetting van het Westijs, in den jare 1777. Amsterdam, 1778. 4°. 36 bladz."

Bosgoed, from whose work (*op. cit.*, p. 249, no. 3575) the above title is taken, states that a German translation appeared at Bremen in 1779, of which Lindeman gives an abstract in his "Arktische Fischerei," pp. 37–46. *See* 1778. ANON. [345.]

1778. CZENPINSKI, P. DE. Pauli de Czenpinski, | Nobilis Poloni Varsoviensis. | Dissertatio | inauguralis | Zoologico-Medica, | sistens | totius Regni Animalis | Genera, | in Classes et Ordines Linnæana | Methodo digesta, | Præfixa cuilibet classi terminorum | explicatione. | [Vignette.] — | Viennæ, | typis Joan Thom. nob. de Trattnern, | Sac. Cæs. Reg. Maj. Typog. et Bibl. | — | 1778. 8°. ll. 4, pp. 1–122, l. 1.

i. *Cete*, p. 114. Genera 1. *Monodon*; 2. *Delphinus*; 3. *Physeter*; 4. *Balæna*. [346.]

1778. FERBER, —. ["Bereitung des Wallraths."] <*Neue Beyträge zur Mineralgeschichte*, i, 1778, p. 366.

Not seen; reference from Donndorff, *Zool. Beytr.*, i, 1792, p. 777. [347.]

1778. "JANSEN, MARTEN. Kort, doch echt verhael wegens het verongelukken van zyn schip, genaemt: het Witte paard, en nog negen andere schepen, dewelke alle verongelukt zijn in Groenlandt ten jaere 1777. Waarby nog copia van een brief van commandeur Hidde Dirks Kat, aan zijn huisvrouw, geschreven uit straat Davis. Amsterdam, Nic. Bijl. 1778. 4°. 18 bladz."

"Eene andere uitgave, Leeuwarden, 1778. 4°. 23 bladz."
Not seen; from Bosgoed, *op. cit.*, p. 239, no. 3486. [348.]

1778. [RÖPER, JÜRGEN.] "Wahrhafte Nachricht von den im Jahre 1777, auf den Walfischfang nach Grönland aufgegangenen und daselbst verunglückten fünf Hamburger Schiffen gezogen aus dem Journal des Küpers Jürgen Röper, auf dem Schiffe genannt Sara Cecilia, Kommandeur Hans Pieters. Altona, 1778."

"Lindeman geeft in zijne 'Arktische Fischerei,' bl. 40, een uittreksel van dit Journaal."
Not seen; title and comment from Bosgoed, *op. cit.*, p. 251, no. 3596. [349.]

1778–83. ZIMMERMANN, E. A. W. Geographische | Geschichte | des Menschen, | und der | allgemein verbreiteten vierfüssigen Thiere, | nebst einer hieher gehörigen | zoologischen Weltcharte, | von | E[berhard]. A[ugust]. W[ilhelm]. Zimmermann, | Professor am Kollegio Karolino zu Braunschweig. | — | Erster Band. [Vignette.] — | Leipzig, | in der Weygandschen Buchhandlung | 1778. 8°. ll. 8, pp. 1–308. Mit ein Chart. Tabvla Mvndi | Geographico Zoologica | sistens | Qvadrvpedes | hucusque notos sedibus suis adscriptos | edidit | E. A. W. Zimmermann. | Aug. Wilh. Knoch delineavit.

Achtzehnter Abschnitt. Der Manate, pp. 253–255.

[Zweiter Band.] Geographische | Geschichte | des Menschen, | und | der vierfüssigen Thiere. | — | Zweiter Band. Enthält ein vollständiges Verzeichniss aller | bekannten Quadrupeden, | von | E. A. W. Zimmermann, | Professor der Mathematik und Naturlehre am Kollegio Karolino | zu Braunschweig. | [Vignette.] — | Leipzig, | in der Weygandschen Buchhandlung. | 1780 8°. ll. 4, pp. 1–432.

XLIII. Geschlecht. Das Walross, *Trichechus*. Enthält das Wallross (*T. Rosmarus*), und der Dugong (*T. Dugung*). XLIV. Geschlecht. Der Manate. Enthält Der Manati von Kamtschatka (*Manati gigas*), und der kleinere Manati (*Trichechus Manatus*, Linn.).

1778-83. ZIMMERMANN, E. A. W.—Continued.

[Dritter Band.] Geographische | Geschichte | des Menschen, | und der | allgemein verbreiteten vierfüssigen Thiere, | — | mit einer hiezu gehörigen zoologischen Weltcharte, | — | von | E. A. W. Zimmermann, | Professor der Mathematik und Physik in Braunschweig und Mitglied | verschiedener gelehrten Gesellschaften. | — | Dritter Band. | — | Leipzig, | in der Weygandschen Buchhandlung | 1783. 8°. ll. 5, pp. 1-278. [350.]

1779. ANON. "Historisch wahre Nachricht von dem Eland und Drangsalen des im Jahre 1777 auf den Wallfischfang nach Grönland abgefahrenen, verunglückten Schiffes "Wilhelmina" unter dem Commandeur Jakob Henrich Broertjes, aus dem Holländischen Tagebuch und mündlicher Erzählung der drei Matrosen Harm Heurich Kröger, Harm Henrich Kröger der Sohn, beide von Altenesch im Delmenhorstischen, und Kasten Külke aus Lessum, eine Meile von Bremen,—übersetzt. Bremen, George Ludwig Förster. 1779."

Not seen; title from Lindeman, *Arktische Fischerei*, 1869, p. 37. A German translation of the Dutch "Echte historisch Verhael," etc., 1778, *q. v.* [351.]

1779. CHEMNIZ, T. H. Von der balaena rostrata oder dem Schnabelfische. <*Beschaft. d. Berlinischen Gesellsch. Naturf. Freunde*, iv, 1779, pp. 183-189.

Hyperoodon rostrata. [352.]

1779. "GRAUMANN, PETR. BENED. CHSTI. Brevis introductio in historiam naturalem animalium mammalium in usum auditorum, cui accedit nomenclatura omnium hujus classis civium, una cum charactere generico et specifico, denominatione germanica ac designatione iconum. 8°. Rostochii, 1779. pp. 90."

Not seen; title from Carus and Engelmann. Cited by Donndorff, *Zool. Beytr.*, i, 1792. [353.]

1779. "HIJLKES, R. Merkwaardig verhaal van Reinier Hijlkes als matroos, met het schip: de hopende Visser, commandeur Volkert Jansz. ten jare 1777 na Groenland uitgevaren op de walvisvangst en aldaar met 9 andere schepen verongelukt. Amsterdam. 1779. 4°. 11 bladz."

Not seen; from Bosgoed, *op. cit.*, p. 239, no. 3484. [354.]

1780. CLAVIGERO, F. S. Storia antica | del Messico | cavata da' migliori storici Spagnuoli, | e da' manoscritti, e dalle pitture antiche degl' Indiani: | Divisi in dieci Libri, | e corredata di carte geografiche, | e di varie figure: | e | Dissertazioni | Sulla Terra, sugli Animali, e sugli abitatori del Messico. | Opera | dell Abate | D. Francesco Saverio | Clavigero | — | Tomo I [-IV.] | — | [Design.] In Cesena MDCCLXXX. | — | Per Gregorio Biasni all' Insegna di Pallade | Con Licenza de' Superiori. 4°. 4 vols. Vol. i, pp. i-viii, 1-302, map, pll.; vol. ii, pp. 1-276; vol. iii, pp. 1-260; vol. iv, pp. 1-331.

Il Manati o sia *Lamentino*, vol. i, pp. 100, 101. See Cullen's English transl. under 1787. [355.]

1780. FABRICIUS, O. Favna | Groenlandica, | systematice sistens | Animalia Groenlandiae occiden- | talis hactenvs indagata, qvoad nomen | specificvm, triviale, vernacvlvmqve; synonyma avcto- | rvm plvrivm, descriptionem, locvm, victvm, genera- | tionvm, mores, vsvm, captvramqve singvli, provt | detegendi occasio fvit, maximaqve parte secvn- | dvm proprias observationes | Othonis Fabricii | Ministri Evangelii, qvondam Groen- | landis ad Coloniam Friderichshaab, posthac Norvagis | Drangedaliæ, nvnc vero Danis hopvnti ivtiae, Mem- | bri Societatis Scientiarvm qvae est Hafniae. | [Vignette.] — | Hafniae et Lipsiae, | Impensis Ioanis Gottlob Rothe, | avlae atqve vnivers. Reg. Bibliopolae. | MDCCLXXX. 8°. pp. i-xvi, 1-452, pl. 1.

Cetacea, pp. 29-52, spp. 18-32, to wit: **1.** *Monodon Monoceros*, p. 29; **2.** *Monodon Spvrivs*, p. 31 = *Hyperoodon rostratus*; **3.** *Balaena Mysticetvs*, p. 32; **4.** *Balaena Physalvs*, p. 35 = *Physalus antiquorum*; **5.** *Balaena Boops*, p. 36 = ? *Physalus antiquorum*; **6.** *Balaena mvscvlvs*, p. 39 = *B. biscayensis*; **7.** *Balaena rostrata*, p. 40 = *Balænoptera rostrata*; **8.** *Physeter macrocephalvs*, p. 41; **9.** *Physeter Catodon*, p. 44 = *Physeter tursio*, L.; **10.** *Physeter microps*, p. 44; **11.** *Delphinvs Orca*, p. 46 = *Orca gladiator*; **12.** *Delphinvs Phocaena*, p. 46 = *Phocæna communis*; **13.** *Delphinvs Delphis*, p. 48; **14.** *Delphinvs Tursio*, p. 49 = *Orca gladiator*; **15.** *Delphinvs albicans*, p. 50 = *Beluga catodon.*

Monodon spurius, *Balæna rostrata*, spp. nn. 15 spp., 12 valid. Synonymy, diagnoses, distribution, etc. [356.]

1780. "Gatterer, Chph. Wilh. Jac. Breviarum zoologiae Pars I. Mammalia. 8 maj. Gottingae, 1780."

Not seen; title from Carus and Engelmann. Cited by Donndorff, *Zool. Beytr.*, i, 1792. [357.]

1780. Launay, *M.* de. Mémoire sur l'origine des Fossiles accidentels des Provinces Belgiques. <*Mém. de l'Acad. imp. et roy. des Sci. et Bell.-Lett. de Bruxelles*, ii, 1780, pp. 531–585.

Brief reference (p. 335) to remains of a supposed skeleton of a Crocodile, here identified as that of an Orca, and also to other Cretacean remains. [358.]

1780. Mann, *L'Abbé.* Mémoire sur l'Histoire naturelle de la Mer du Nord, & sur la Pêche qui s'y fait. < *Mém. de l'Acad. imp. et roy. des. Sci. et Bell.-Lett. de Bruxelles*, ii, 1780, pp. 157–220.

Cétacés, p. 197.

"26. Les especes de *poissons* qui habitent ou qui fréquentent la mer du nord, sont les suivantes, savoir:

"*Cete*—le Cachelot.

"*Balæna*—la Baleine.

"*Physeter*—la Sédenette.

"*Monoceros*—le Narhwal.

"Ces quatres especes de poissons n'habitent point la mer du nord, mais ils y viennent quelquefois de l'océan septentrional, surtout dans les hyvers rudes. On a eu l'exemple de baleines jettées sur la côte de Flandre" . . . (p. 197). [359.]

1780. "Sérionne, A. de. Hollands rijkdom, behelzende den oorsprong van den koophandel, en van de magt van dezen staat; de toenemende vermeerdering van deszelfs koophandel en scheepvaart, enz. Uit het Fransch vertaald. Vervolgens overgezien, merkelijk veranderd, vermeerderd en van verscheiden misslagen gezuiverd door El. Luzac. Leyden, Luzac en van Dame, 1780. 4 dln. gr. 8°."

Noordsche visscherij en koophandel, i, pp. 345–350. Walvischvangst, ii, pp. 275–280.
Not seen; title and references from Bosgoed, *op. cit.*, p. 210, no. 3167. [360.]

1780. Witry, *L'Abbé* de. Mémoire sur les fossiles du Tournaisis, et les pétrifactions en général, relativement à leur utilité pour la vie civile. <*Mém. de l'Acad. imp. et roy. des Sci. et Bell.-Lett. de Bruxelles*, iii, 1780, pp. 11–44, pl. i–iii.

A reference of four lines to remains of "poissons marins . . . qui paroissent avoir appartenu à des animaux cétacés" (p. 21). [361.]

1780–84. "Borowski, G. H. Gemeinnützige Naturgeschichte des Thierreichs, darinnen die merkwürdigsten und nützlichsten Thiere in systemat. Ordnung beschrieben und alle Geschlechter in Abbildungen nach der Natur vorgestellt werden. Mit den Kupfertaf. 1–228. Berlin und Stralsund, Lange, 1780–84. 5 dln. gr. 8°."

"1. Bd. Säugethiere. Mit 48 Kpfrtaf. 2. Bd. Wallfische, Vögel. Mit 48 Kpfrtaf. 3. Vögel. Mit 48 Kpfrtaf. 4. Amphibien. Mit 36 Kpfrtaf. 5. Fische. Mit 42 Kpfrtaf."

Not seen; title from Carus and Engelmann. Cited by Donndorff, *Zool. Beytr.*, i, 1792. [362.]

1780–84. "Gilii, Filippo Salvadore. Saggio di Storia Americana, o sia Storia Naturale, Civile, e Sacra de Regni, e delle provincie Spanuole di Terra-ferma nell' America Meridionale. 4 vols. 8°. Roma, 1780, '81, '82, '84."

Not seen; title from Carus and Engelmann. Have seen this work referred to as containing (vol. i, p. 84, fig. 1) an account of the Manatee, with a figure. [363.]

1781. E[riksson], J. Um Marsvina rekstr. <*Rit dess Islenzka Lærdoms-Lista Felags* [ii], 1782, pp. 73–96.

I. Kap. Um adferd Medalfarar manna, pp. 73–85; II. Kap. Um adferd Færeyinga og Sunnmæra, pp. 85–96. [364.]

1781. Fabricius, Otho. Om Hvalaaset. <*Nye Saml. Kong. Danske Videnskabers Selskabs Skrifter*, 1781, pp. 557–378 (*i. e.* 578), figg. 1–4. [365.

1781. Gronovius, Laur[entius] Theod[orus]. Zoophylacium | Gronovianum, | exhibens | Animalia | Quadrupeda, Amphibia, | Pisces, Insecta, Vermes, | Mollusca, Testacea, | et Zoophyta, | Quae in Museo suo adservavit, examini | subjecit, systematice disposuit | atque descripsit | Laur. Theod. Gronovius,

1781. Gronovius, Laur[entius] Theod[orus]—Continued. J. U. D. | Civitatis Lugduno Batavæ Senator, Societatis physico- | medicæ regiæ Londinensis, Basilæensis, | atque Hollandicæ Socius. | Additis rarissimorum objectorum iconismis. | — | Lugduni Batavorum, | Apud | Theodorum Haak et Socium | et | Samuelem et Johannem Luchtmans. | MDCCLXXXI. [3 fasc. paged continuously.] fol. ll. 5, pp. 1–380, ll. 10, pp. i–vi, pll. 21.

This is a reissue of the first and second fasc. of the *Zoophylacii* [pp. 1–236]+fasc. iii, Vermes, etc., 1781, pp. 237–380.

The Cetacean matter is therefore the same as in the *editio princeps*, *q. v.*, at 1763. [366.]

1781. [Pennant, Thomas.] History | of | Quadrupeds. | Vol. I [II]. | [Coat of arms.] London. | Printed for B. White, Fleet Street. | MDCCLXXXI. 2 vols. 4°. Vol. i, l. 1, pp. i–xxiv, 1–284; vol. ii, l. 1, pp. 285–565, ll. 7.

Sirenia, pp. 536–545, to wit: 1. Whale-tailed Manati, pp. 536–539; 2. Round-tailed Manati, pp. 540–544; 3. Sea Ape, pp. 544, 545. The first is primarily Steller's Sea Cow; the second includes both the American and African Manatees; the last is a sp. myth. [367.]

1781. "Westerwout, J. Dibbetz. Beknopte beschrijving der XVII Nederlandsche provinciën, waarin den oorsprong en opkomst dezer landen aangetoond wordt. Nijmegen, Is. van Campen, 1781. gr. 8°."

". . . Visscherij; Haringvangst; Walvischvangst, pp. 467–486."

Title and reference from Bosgoed, *op. cit.*, p. 213, no. 3188. [368.]

1782. Buffon, [G. L. Leclerc de.] Histoire | Naturelle, | générale et particulière. | Par M. le Compte [George Louis Leclerc] de Buffon, Intendant du | Jardin & du Cabinet du Roi, de l'Académie | Françoise, de celle des Sciences, &c. | — | Supplément, Tome Sixième. | — | [Arms.] A Paris, | de l'Imprimerie Royale. | — | M. DCCLXXXII. 4°. pp. i–viij, 1–405, i–xxv, pll. i–xlix.

Les Lamantins, pp. 381–384. Le grand Lamantin de Kamtschatka, 385–395. Le grand Lamantin des Antilles, pp. 396–398. Le grand Lamantin de la mer des Indes, p. 399. Le petit Lamantin d'Amérique, pp. 400–402. Le petit Lamantin du Sénégal, pp. 403–405. [369.]

1782. Duhamel du Monceau, *M.* Traité Général | des Pêches, | et | Histoire des Poissons | qu'elles fournissent, | tant pour la subsistance des hommes, | que pour plusieurs autres usages | qui ont rapport aux Arts et au Commerce. | Par M. Duhamel du Monceau, de l'Académie Royale des Sciences; | . . . [=titles, 3 lines]. | — | Suite de la Seconde Partie. | — | Tome Quatrieme. | [Design.] A Paris, | Chez Veuve Desaint, Libraire, rue du Foin Saint-Jacques. | — | M. DCC. LXXXII. | Avec Approbation, et Privilége du Roi. 4 vols. 2°.

Traité général des Pêches et Histoire des Poissons, ou des animaux qui vivent dans l'eau. Suite de la seconde Partie. Tome iv. Dixieme Section. Des Poissons Cetacées, & des Amphibies. pp. 1–73, pll. i–xv.

Introduction, pp. 1, 2. Chap. i. De la Baleine, & des Poissons qui y ont rapport, pp. 2, 3. Art. i. De la Baleine franche; Cete; Balæna vulgaris, edentula, dorso non pinnato, Raii, pp. 4–9, pl. i, figg. 1, 2. Art. ii. Des différents lieux où l'on trouve des Baleines, pp. 9–11. Art. iii. Détails relatifs aux Navires qu'on destine pour faire la pêche des Baleines au Nord dans les glaces, p. 11, pl. i, fig. 3, pl. iii, fig. 3. Art. iv. Détail sommaire des utensils nécessaires pour la pêche, pp. 11, 12, pl. ii. Art. v. De la disposition des glaces au Nord, pp. 12, 13. Art. vi. De la nourriture des Baleines, p. 13. Art. vii. De la pêche des Sardes, ou petites Baleines, que je soupçonne être le Nord-Kaper, p. 14. Art. viii. Des endroits où l'on fait les Armements, p. 14. Art. ix. Sur les gages des Equipages, pp. 14, 15. Art. x. Etat des effets, dont ceux qui forment l'équipage doivent se fournir pour faire une campagne de pêche, p. 15. Art. xi. De la Nourriture des Equipages, p. 15. Art. xii. De la pêche des Baleines en général, pp. 16–18. (§ 1. Des Harpons. § 2. Des Lances. § 3. Des Crocs. § 4. Des Couteaux.) Art. xiii. De la pêche des Baleines, particulierement avec les harpons, pp. 18, 19. Art. xiv. De l'Embarquement des Chaloupes, pp. 19, 20. Art. xv. De la maniere de lever le gras, ou de découper les grandes Baleines pour en retirer l'huile, pp. 20, 21. Art. xvi. Méthode pour retirer l'huile des Baleines, p. 22. Art. xvii. Sur la jauge des futailles, p. 23. Art. xviii. Des différentes qualité & nature des huiles de Baleine, pp. 23, 24. Art. xix. Exposé sommaire de la pêche des Baleines en différents Parages, & de la pêche accidentelle de ces poissons, pp. 24–29. (§ 1. De la pêche aux côtes de Biscaye, de Galice & de Saint-Jean-de-Luz. § 2. De la Pêche aux Côtes d'Angleterre. § 3. De la pêche des Baleines par les Groenlandois. § 4. De la pêche en Schetland, ou Hithland. § 5. De la pêche en Norwege. § 6. De la pêche de la Baleine en Russie. § 7. De la pêche par les Hollandois à Spitzberg. § 8. De la pêche des Baleines au Japon. § 9. De la pêche des Baleines à la Corée. § 10. De la maniere de prendre

1782. Duhamel du Monceau, *M.*—Continued.

les Baleines à la Floride, dans l'Amérique Septentrionale, par les Sauvages du pays. § 11. Description des Chaloupes qui servent pour prendre des Baleines dans les environs du Canada. § 12. Idée générale des pêches qu'on fait à Sinigaglia, jolie petite Ville située au bord de la Mer Adriatique.) Art. xx. Sur les ennemis des Baleines, pp. 29–31. Art. xxi. De l'Ambre gris; *Ambra grisea*, pp. 31, 32.

Chap. ii. Des Cétaceés. Art. i. Du Cachalot, pp. 32–36. Art. ii. Des Souffleurs, pp. 36–37. Art. iii. Des Marsouins, *Tursio;* en Breton *Meroch;* par quelques-uns, Souffleur, pp. 38–42. (§ 1. Du grand Marsouin, que plusieurs nomment *Souffleur*, p. 41. § 2. Du Marsouin à museau arrondi; *Tursio* ou *Phocæna*, qu'on regarde comme le vrai Marsouin (figg. 5 & 6).) Art. iv. Des Dauphins, pp. 42–45.

Chap. iii. Des Amphibies, p. 45. Art. i. Du Loup, Veau Marin, ou Phoque; *Phoca*, pp. 45–51. Art. ii. Description d'un petit Phoque noir, à poil fin & ondé, pp. 51, 52. Art. iii. D'un petit Phoque, copié sur le dessein qui est dans l'Histoire Naturelle de M. de Buffon, tome xiii, p. 52. Art. iv. Lettre de M. Frameris, sur les Phoques qu'on prend dans les Mers du Nord, pp. 52, 53. Art. v. Description d'un Phoque qui avoit été pêché dans notre Océan Septentrional, & apporté à Dieppe en 1723, fig. 5, p. 53. Art. vi. Description d'un Phoque de la Mediterranée, envoyé de Marseille, pp. 53, 54. Art. vii. De quelques Phoques, qu'on a conservé vivans dans plusieurs endroits, pp. 54–56. Art. viii. Du Lamentin, pp. 56, 57. De la pêche des Lamentins, pp. 57–59. Art. ix. De la Vache marine, ou Poisson à la grande dent, Morse d'Islande & du Groenland; *Odobenus*, ou *Rosmarus*, pp. 59–61. Art. x. De plusieurs autres Amphibies, & particuliérement du Lion Marin; *Leo Marinus*, p. 61.

Explication des planches, pp. 62–66. Notice géographique des principaux lieux dont il est fait mention dans cette dixieme Section, pp. 67–70. Table Alphabetique, p. 71. Table des Chapitres et Articles, pp. 72, 73. Errata, etc., p. 73.

Pl. i. Baleine franche, fig. 1, mâle; fig. 2, femelle; fig. 3, deux chaloupes qui poursuivent une Baleine; figg. 4–6, fanons. Pl. ii. Instruments pour la pêche des Baleines. Pl. iii–viii. Pêche des Baleines. Pl. ix, fig. 1, Cachalot d'Anderson; fig. 2, 3, Souffleurs; fig. 4, Souffleur du fleuve Saint-Laurent; fig. 5, Marsouin; fig. 6, Mulard de Rondelet; fig. 7, squélette de la mâchoire inférieure d'un Cachalot. Pl. x. Des Marsouins, 8 figg. Pll. xi, xii. Des Loups Marins, ou Phoques. Pl. xiii. Du Lamentin et du Pêche du même. Pl. xiv. De la Vache Marine: fig. 1, Vache Marine avec son petit; fig. 2, squelette d'une tête de Vache Marine; fig. 3, Tuerie de differents Cetacées. Pl. xv, fig. 1, Pescheurs Groenlandois; fig. 2, Lion Marin avec sa Lionne; fig. 3, Cachalot Male.

Duhamel's work was, for its time, a thorough presentation of the subject, relating, as its title implies, to the subject of the fisheries rather than to the natural history of fishes, although of importance in this relation, especially from the numerous original figures given. Those of the Cetacea, however, are in part copies from those of earlier writers, some of them more or less modified. His account of the Whalefishery, in relation to the capture and subsequent treatment of the animals, is detailed and very fully illustrated in the plates, and forms a valuable contribution to the history of the subject. [370.]

1782. Le Grand d'Aussy. "Histoire de la vie privée des Français, depuis l'origine de la nation jusqu'à nos jour. Paris, Imprimerie de Ph. D. Pierres. 1782. 3 dln. gr. 8°."

Pêche de la Baleine chez les Basques, ii, pp. 68–77.

Not seen; title and reference from Bosgoed, *op. cit.*, p. 237, no. 3465. [371.]

1782. St. John [de Crèvecœur], J. Hector. Letters | from an | American Farmer; | describing | certain provincial situations, | manners, and customs, | not generally known; | and conveying | some idea of the late and present | interior circumstances | of the | British Colonies | in | North America. | — | Written for the information of a Friend | in England, | By J. Hector St. John [de Crèvecœur], | A farmer in Pennsylvania. | — | London, | Printed for Thomas Davies in Russel Street, Covent- | Garden, and Lockyer Davis in Holborn. | M DCC LXXXII. 8°. ll. 8, pp. 1–318, 2 maps.

Letter v. Customary Education and Employment of the Inhabitants of Nantucket, pp. 150–158 (relates mainly to the Whalefishery of this island). Letter vi. Description of the Island of Martha's Vineyard; and of the Whale Fishery, pp. 159–176. Pp. 162–176 relate to the Whalefishery, describing the character, size, and outfit of the vessels employed, the manner of capturing Whales, "cutting in," and care of the products, etc. At p. 169 is a list of "the names and principal characteristics of the various species of Whales known to these people" of Nantucket; 11 species being enumerated and briefly described. There are also statistics of the Nantucket Whalefishery for the year 1769. [In the French ed. of 1787 the letter about the Whalefishery is dated "Nantucket, 17 Octobre 1772."]

1782. St. John [de Crèvecœur], J. Hector—Continued.

A "New Edition, with an Accurate Index," appeared in 1783, textually the same as the present. There are also later editions in English (that of 1793 is given *infrà*), and in French, the author himself translating and publishing his "Letters" in that language in 1784 (*q. v.*; see, also, under 1787). Also *cf.* Rich, *Bibliotheca Americana Nova*, p. 302. [372.]

1782–84. "Bock, Friedr. Sam. Versuch einer wirtschaftl. Naturgesch. von Ost- u. West-preussen. 5 Bde. Mit Kpfrn. gr. 8°. Dessau, 1782–84."

Not seen; title from Carus and Engelmann. Cited by Donndorff, *Zool. Beytr.*, i, 1792, p. 782. [373.]

1783. "Hermann, Joa. Tabula affinitatum animalium, per totum animale regnum in tribus foliis exposita, olim academico specimine edita, nunc uberiore commentario illustrata, cum annotationibus ad historiam naturalem animalium augendam fascientibus. 4°. Argentorati, 1783."

Not seen; title from Carus and Engelmann. Cited by Donndorff and others. [374.]

1783. [London Society for, etc.] [Gun Harpoons.] <*Trans. London Soc. for Encour. Arts, Man., and Com*, i, 1783, pp. 42, 215.

"Whale-Fishery," p. 42 (announcement of the successful introduction of the gun harpoon). "Gun for throwing Harpoons," p. 215 (prize offered for improvement in its construction). "Harpoon to be thrown by a Gun," p. 215 (prize offered for improvements in its construction). These offers, as also a prize for the capture of Whales by use of the harpoon gun, were annually renewed by the society for many years. See the society's *Trans.*, 1784 *et seq.* [375.]

1783. Schwediawer, F. X. An Account of Ambergrise. . . . <*Philos. Trans. Lond.*, lxxiii, pt. 1, art. xv, 1783, pp. 226–241.

A detailed account of nature, mode of occurrence, and use of ambergris and spermaceti. [376.]

1784. Boddaert, P. P. Boddaert med. doct. | . . . . [=titles, 7 lines] | Elenchus Animalium. | Volumen I. | Sistens Quadrupedia huc usque nota, | eorumque varietates. | Ad ductum Naturæ, quantum fieri potuit disposita. | — | . . . . [=motto, 6 lines]. | — | Roterodami, | Apud C. R. Hake. | MDCCLXXXIV. 8°. pp. i–xxxviii, 1–174.

The Cetacea are not included. The Sirenia are: 1. *Rosmarus Indicus*, p. 169=Indian Walrus, Pennant and Dugon, Buffon; 2. *Manati Trichechus*, p. 173=The Broad-tailed Manati, Pennant; 3. *Manatus Balænurus*, p. 173=Whale-tailed Manati, Pennant, therefore=*Rhytina borealis*. [377.]

1784. Chemnitz, T. H. Auszug aus einem Schreiben des Herrn Garnisonprediger Chemnitz zu Coppenhagen, an den Herrn O. C. R. Silberschlag, vom 29sten July, 1783. 5 Taf. Fig. 4 bis 7. <*Schriften der Berlinischen Gesellschaft naturforscher Freunde*, v, 1784, pp. 463–469.

Account of the capture of a "Nordkaper" "etwa zwischen Neufundland und Island," from the head of which were obtained examples of the *Balanus polythalamius compressus*, the same being here described and figured, etc. [378.]

1784. Foord, Humphrey. A short Account of the Invention of the Gun Harpoon, which has been introduced into the Greenland Fishery, by means of the Rewards bestowed by the Society; the utility of which will be manifested, by the Facts related in the following Letters. < *Trans. London Soc. Encour. Arts, Man., and Com.*, ii, 1784, pp. 191–222, pl.

Account of "an Harpoon to be fired from a Swivel Gun," invented by Abraham Staghold, in 1771, with a plate giving figures of the harpoon and gun, pp. 191–196. Six letters from Captain Humphrey Foord, giving accounts of the capture of Whales by the Gun Harpoon, and claiming premiums therefor, pp. 197–222. The account gives also the "length of bone" and yield of oil of several of the Whales thus taken. [379.]

1784. "Leske, Nathan. Gtfr. Anfangsgründe der Naturgesch. 1 Th. Allgem. Natur- u. Thiergeschichte, mit 12 Kpfr. 2 Aufl. gr. 8°. Leipzig, 1784."

Not seen; title from Carus and Engelmann. Cited by Donndorff. The first edition is said to have appeared in 1779. [380.]

1784 (*circa*). Lichtenberg, Geo. Chph. Potfisch. <*Mag. für Neuste aus der Phys. u. Naturg.*, ii, (1784?), p. 204.

Not seen; title and reference based on Donndorff, *Zool. Beytr.*, i, 1792, p. 777. [381.]

1784. [St. John de Crèvecœur, J. Hector.] Lettres | d'un | Cultivateur | Américain, | [J. Hector St. John Crèvecœur] Écrites a W. S. Ecuyer, | Depuis l'Année 1770, jusqu'à 1781. | Traduites de l'Anglois par * * *. | Tome Premier [et Second]. | [Design.] A Paris, | Chez Cachet, Libraire, rue & hôtel Serpente. | — | M. DCC. LXXXIV. 2 vols. 8°. Vol. i, pp. i–xxiv, i–iv, 1–422, l. 1; vol. ii, ll. 2, pp. i–iv, 1–400, l. 1. [The copy here collated (Harvard College Library, 15332–22) contains manuscript corrections of numerous typographical errors and additions by the author, with his autograph.]

Septième Lettre. Pêche de la Baleine, vol. ii, pp. 147–157.

This is a much altered and enlarged version, more or less changed throughout, rather than a "translation," as the title-page implies, of the "Letters from an American Farmer" (London, 1782), with a dedication to the Marquis de Lafayette, which is dated "New Yorck, 24 Septembre 1781," and signed "L'auteur & Traducteur," with, in manuscript, the word "Crevecoeur" added in the copy examined. The matter relating to the Nantucket Whalefishery is substantially the same as that of the English ed. of 1782 (*q. v.*), of which it is, however, by no means a strict translation. [382.]

1784. "Schneider, J. G. Sammlung vermischter Abhandlungen zur Aufklärung der Zoologie und der Handelsgeschichte. Berlin, 1784. 8°."

"Zie aldaar: Kritische Sammlung von alten und neueren Nachrichten zur Naturgeschichte der Wallfische, nebst der Geschichte ihres Fanges und des damit verbunden Handels, bl. 125–303."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 173, no. 2728. [383.]

1784–86. Anon. "De Walvischvangst met veele bijzonderheden daartoe betrekkelijk. Amsterdam en Harlingen, bij P. Conradi en V. van der Plaats, 1784–86. 4 dln. 4°."

Not seen; title from Bosgoed (*op. cit.*, p. 250, no. 3583), who gives as a new edition of this work the *Nieuwe beschrijving der Walfischvangst*, etc., 1791, *q. v.* [384.]

1785. Daubenton, [L. J. M.] Observations sur un grand os qui a été trouvé en terre dans Paris; et sur la conformation des Os de la tête des Cétacées. < *Hist. de l'Acad. roy. des Sci. de Paris*, ann. 1782 (1785), pp. 211–218, pll. iv–vi.

Pl. iv, tête d'un petit Cachalot; pll. v, vi, tête du Dauphin. [385.]

1785. "Gatterer, Chph. Wilh. Jac. Naturhist. A-B-C-Buch, od. Abbild. u. Beschreib. merkwurd. Thiere. 1785. 3 Aufl. 1799. Mit Kpfr. 8°."

Not seen; title from Carus and Engelmann. [386.]

1785. Halcrow, Sinclear. [Account of capture of a Whale by use of the Harpoon Gun.] < *Trans. London Soc. Encour. Arts, Man., and Com.*, iii, 1785, pp. 154–157. [387.]

1785. Monro, A. The | Structure and Physiology | of | Fishes | explained, | and | compared | with those of | Man and other Animals. | — | Illustrated with Figures. | — | By Alexander Monro, M. D. | Fellow of the Royal College of Physicians, | and of the Royal Society, | and | Professor of Physic, Anatomy, and Surgery, in the University | of | Edinburgh. | CE | Edinburgh: | Printed for Charles Elliot, Edinburgh; And G. G. J. and J. Robinson, London. | — | M, DCC, LXXXV. 2°. pp. 1–128, pll. i–xliv.

Of the Ear in Cetaceous Fishes, pp. 45, 46, 109–112, pl. xxxv, figg. 19 ("Nose, mouth, ear. and larynx of a Porpess"). [388.]

1785. Pontoppidan, C. Hval- og Robbefangsten | udi | Strat-Davis, ved Spitsbergen, og under | Eilandet Jan Mayen, | samt | dens vigtige Fordele, | i Anledning | af den Kongel. allern. Placat af 13 Octbr. 1784; | tilligemed | nogle oplysende Efterretninger om Fangsten, Behandilings- | maaden, m. m. | ved | Carl Pontoppidan, | Kongel. Maj. virkelig Justiceraad og medadministrerende Directeur | ved den Kongel. Islandiske, Finmarske, &c. &c. Handel. | [Vignette.] | — | Hermed følger et Kobber. | — | Kiøbenhavn 1785. | Trykt paa Syldendals Forlag, | hos Frid. Wilh. Thiele. 8°. ll. 3, pp. 1–124. [389.]

1785. "Witsen, Nic. Noord en Oost Tartarijen; behelzende eene beschrijving van verscheidene Tartersche en nabuurige gewesten, in de noorder en oostelijke deelen van Aziën en Europa. Zedert naauwkeurig onderzoek van veele Jaren,

1785. "Witsen, Nic.—Continued.
en eigen ondervinding ontworpen, beschreven, geteekent en in 't licht gegeven. Tweede druk, nieuwe uitgaaf, verryckt met eene Inleiding (door P. Boddaert) en met eene meenigte (105) afbeeldingen (platen en kaarten) versierd. Te Amsterdam, bij M. Schalekamp, 1785. 2 dln. folio.

"Zie aldaar: Groenlandt; Nova-Zembla; Straet Davids; Waygats, bl. 45, 93, 762, 782, 832, 834, 892, 897–906, 915, 919–926, 928, 940, 951, waar tevens van de vischvangst, vooral van de walvisch- en walrusvangst gesproken wordt. Witsen heeft zich in zijne berigten dikwijls van de mondelinge mededeelingen van walvischvaarders bediend. Verder: Visch in de Kaspische zee, bl. 614, 690. Visch in Siberië, bl. 787. Vischvangst in 't Samoyeden-landt, bl. 955. Haringvangst in Siberië, bl. 745.

"Vergelijk: *Fr. Muller*, Essai d'une bibliographie Néerlando-Russe, bl. 58, waar eenige belangrijke bijzonderheden en eene naauwkeurige bibliographische beschrijving van dit werk te vinden zijn."

Not seen; title and references from Bosgoed, *op. cit.*, p. 252, no. 3607. [390.]

1785–88. "Goeze, Joh. Aug. Ephr. Nützliches Allerley aus der Natur u. dem gemeinen Leben für allerley Leser. 6 Bde. 8°. Leipzig, 1785–88."

"Neue verbess. Ausg. in 3 Bdn. 8. Leipzig, 1788."

Not seen; title from Carus and Engelmann. Cited by Donndorff. [391.]

1785–92. Fischer, F. C. J. Friedrich Christoph Jonathan Fischers | Geschichte | des | teutschen Handels. | — | Der Schiffarth, Fischerei, Erfindungen, Künste, Gewerbe, Manufakturen, | der Landwirthschaft, Polizey, Leibeigenschaft, des Zoll- Münz- | und Bergwesens, des Wechselrechts, der Stadtwirthschaft | und des Luxus. | — | Erster [-Vierter] Theil. | — | Hannover, | in der Helwingschen Hofbuchhandlung. | 1785 [-1792]. 4 vols. 8°. Theil i, 1785; Theil ii, 1785; Theil iii, 1791; Theil iv, 1792.

Wallfischfang, Theil iv, pp. 265–272.—Geschichte des Wallfischfangs, der seit der ältesten Zeit von den äussersten Nordischen Völkern getrieben wird. Noch giebt es weder bey der Hansa noch in Holland förmliche Wallfischjäger. Nachricht von Wallfischen, die auf die Niederländische Küste gerathen sind. Erst gegen Ende des [sechzehnten] Jahrhunderts fangen die Biscayer und Engländer an, auf den Wallfischfang auszugehen: und die Holländer werden erst bey der versuchten Nordöstlichen Durchfarth mit dem Wallfischfange bekannt. [392.]

1786. Camper, P. Conjectures relative to the Petrifactions found in *St. Peter's* Mountain, near *Maestricht*. <*Philos. Trans. Lond.*, lxxvi, pt. 2, art. xxvi, 1786, pp. 443–456, pll. xv, xvi.

Descriptions and figures of various fossil remains, including bones and teeth of *Phocœna* and *Physeter* and part of lower jaw of *Squalodon*. [393.]

1786. "Cranz, D. Hedendaagsche historie, of tegenwoordige staat van Groenland en Straat Davids, benevens eene uitvoerige beschryving van de walvisch- en robbenvangst. Amsterdam, 1786. 3 vols. 8°. Maps and pll."

"Exactly the same work as the preceding [Dutch ed. of 1767], only the title reprinted." F. Muller, *Cat. Am. Books*, 1877, no. 836. [394.]

1786. [Jarman, Nathaniel, William Brown, *and others*.] [Letters and Certificates in reference to the capture of Whales with the Gun-Harpoon.] <*Trans. London Soc. Encour. Arts, Man., and Com.*, iv, 1786, pp. 179–182. [395.]

1786. Mohr, N. Forsøg | til | en Islandsk | Naturhistorie, | med | adskillige oekonomiske samt andre | Anmœrkninger, | ved | N[iels]. Mohr. | — | — — — Siquid novisti rectius istis, | Candidus imperti; si non, his utere mecus. | Horat, Epist. Libr. I. 6. | — | Kiøbenhavn, | trykt hos Christian Friderik Holm, | 1786. 8°. pp. i–xvi, 1–414.

VII. *Cete*, Hvale, pp. 12–17, spp. 22–32. 1. *Monodon monoceros*; 2. *Balœna Mysticetus*; 3. *B. Physalus*; 4. *B. Boops*; 5. *B. Musculus*; 6. *B. Rostrata*, p. 13; 7. *Physeter Macrocephalus*; 8. *P. Microps*; 9. *Delphinus orca*; 10. *D. Phocœna*; 11. *D. Delphis*; 12. *D. Albicans*, p. 14.

List with brief notes. [396.]

1787. Clavigero, F. S. The | History | of | Mexico. | Collected from | Spanish and Mexican Historians, | from | Manuscripts, and Ancient Paintings of the In-

1787. CLAVIGERO, F. S.—Continued.

dians. | Illustrated by | Charts, and other Copper Plates. | To which are added, | Critical Dissertations | on the | Land, | the Animals, | and Inhabitants of Mexico. | By Abbé D. Francesco Saverio Clavigero. | Translated from the Original Italian, | By Charles Cullen, Esq. | In Two Volumes. | Vol. I [II]. | London, | Printed for G. G. J. and J. Robinson, No. 25, Pater-noster Row. | MDCCLXXXVII. 2 vols. 4°. Vol. i, ll. 2, pp. iii–xxxii, 1–476, pll. i–xxiv, map. Vol. ii, ll. 2, pp. 1–463.

The *Manati* or Lamentin, i, pp. 62, 63. The text gives but 10 lines to this animal, to which are added foot-notes to the amount of 18 lines.

There is a second English 4° ed., London, 1807, with the same pagination for the body of the work. A later American reprint in 3 vols., 8°, appeared at Philadelphia in 1817, in which the passage about the *Manati* or *Lamentin* occurs in vol. i, p. 83. There are German and other translations given by bibliographers, not seen by me. [397.]

1787. [HOLLINGSWORTH, S.] The | Present State | of | Nova Scotia: | with a brief | Account of Canada, | and the | British Islands | on the coast of | North America. | — | The Second Edition, corrected and enlarged. | Illustrated with a map. | — | . . . . [=quotations, 3 lines]. | Edinburgh: | Printed for William Creech, Edinburgh; | and sold by | T. Cadell, and G. Robinson & Co. London. | — M, DCC, LXXXVII. 8°. pp. 1–6, vii–xii, 1–221.

On the importance of giving every possible encouragement to the Canadian Whale-fishery, pp. 153–155. It is predicted that the Whale-fishery from Canadian ports "will soon put an end to that of Nantucket"! [398.]

1787. HUNTER, JOHN. Observations on the Structure and Oeconomy of *Whales*. <*Phil. Trans. Lond.*, lxxvii, pp. 371–450, pll. xvi–xxiii. Read June 28, 1787.

[General Remarks], pp. 371–381; Of the Bones, pp. 381–386; Of the Construction of the Tail, pp. 386, 387; Of the Fat, pp. 387–394; Of the Skin, pp. 394–397; Of the Mode of catching their Food [includes descriptions of the digestive organs], pp. 397–416; Of the Larynx, pp. 416–418; Of the Lungs, pp. 418–420; The Blow-hole, or Passage for the Air, pp. 420–426; Of the Sense of Touch, p. 426; Of the Sense of Taste, pp. 426, 427; Of the Sense of Smelling, pp. 428–430; Of the Sense of Hearing, pp. 430–437; Of the Organ of Seeing, pp. 437–441; Of the Parts of Generation, pp. 441–446; Explanation of the Plates, pp. 447–450.

The observations relate to the following species: **1.** "*Delphinus phocæna*, or Porpoise"; **2, 3.** "Grampus," two species, pll. xvi, xvii, animal; **4.** "*Delphinus delphis*, or Bottle-nose Whale," pl. xviii, animal; **5.** Another, but of a different genus, having only two teeth in the lower jaw = *Hyperoodon*, pl. xix, animal; **6.** "*Balæna rostrata* of Fabricius," pl. xx, animal, pl. xxi, external parts of generation, pl. xxii, one of the plates of whalebone, pl. xxiii, a perpendicular section of several plates of whalebone; **7.** "*Balæna mysticetus*, or large Whalebone Whale"; **8.** "*Physeter macrocephalus*, or Spermaceti Whale"; **9.** "*Monodon monoceros*, or Narwhale."

These species are treated *passim*, under the sub-headings above given.

Hunter's celebrated memoir was for many years the principal source of information respecting the anatomy of Cetaceans, and is even still quotable. His observations were repeatedly copied, more or less extensively, by many subsequent writers, and his figures were reproduced in many of the older works, notably by Bonnaterre (1789), who faithfully copied all but one (pl. xix), which he also reproduced with modifications, *e. g.*, the insertion of the two teeth in the lower jaw. [399.]

1787. MONRO, A. Vergleichung | des | Baues und der Physiologie der Fische | mit dem | Bau des Menschen und der übrigen Thiere | durch Kupfer erläutert | von | Alexander Monro. | — | Aus das Englischen übersezt | und mit eignen Zusätzen und Anmerkungen von P. Campern vermehrt | durch | Johann Gottlieb Schneider. | — | Leipzig, bey Weidmanns Erben und Reich. 1787. 4°. ll. 4, pp. 1–192, ll. 2, pll. i–xxxiii.

Von dem Ohre der Wallfischarten, pp. 53, 54, 65–71, pl. xxv.

In this version the text is greatly increased and the plates much changed and reduced in number. For the original ed., *see* 1785. MONRO, A. [400.]

1787. "MOOI, MAARTEN. Journael van de reize naer Groenlandt, gedaen door commandeur M. Mooi met het schip Frankendaal, behelzende zijne uitreize van Amsterdam 22 April 1786, bezetting in het ijs, zedert den 10 Junij, het voorgevallene met de commandeurs H. C. Jaspers, M. Weatherhead, W. Allen en Volkert Klaassen of Jung Volkert Knudsten, welke twee Engelsche comm.

1787. "MOOI, MAARTEN—Continued.
beide hunne schepen verloren hebben; de gelukkige verlossing van den Altoonaasvaarder Gottenburger en van hem M. Mooi, met veel aanmerkelyke byzonderheden. Amsterdam, David Weege, 1787. 4°. 71 blz."

Not seen; title from Bosgoed, *op. cit.*, p. 243, no. 3518. [401.]

1787. ST. JOHN DE CREVE COEUR, [HECTOR]. Lettres | d'un Cultivateur | Américain | addressées à Wm. S . . . on, Esq^r. | depuis l'Année 1770 jusqu'en 1786.—Par M. St. John | De Creve Cœur, | Traduites de l'Anglois, | Keen feelings inspire resistless thoughts. | Tome I[-III]. | [Vignette.] A Paris. | Chez Cuchet Libraire, Rue et Hôtel Serpente. | 1787. 3 vols. 8°. Vol. i, front., engr. title, pp. i–xxxij, 1–478, l. 1, map and 2 pll.; vol. ii, l. 1, pp. 1–438, ll. 3, 3 maps; vol. iii, l. 1, pp. 1–592, 1 map and 1 pl.

Septième Lettre. Pêche de la Baleine, pp. 153–163.

Vols. i and ii appear to be the same as the two-volume edition of 1784, with the addition of maps and of several pages of new matter at the end of each volume. Vol. iii is wholly additional. The matter relating to the Whalefishery is the same as that of the 1784 ed. (*q. v.*), except that the "lettre" here bears the date "Nantucket, 17 Octobre 1772." [402.]

1788. "BATSCH, AUG. JOH. GEO. KARL. Versuch einer Anleit. zur Kenntniss u. Geschichte der Thiere u. Mineralien, für akad. Vorlesungen entworfen u. mit den nöthigsten Abbildgn versehen. 2 Thle. Mit 7 Kpfrtaf. gr. 8°. Jena 1788, '89."

"1 Thl. Mit d. Kpfrtaf. 1–5, 1788. 2 Thl. Besondere Geschichte der Insecten, Gewürme u. Mineralien. Mit den Kpfrtaf. 6 u. 7, 1789."

Not seen; title from Carus and Engelmann. Cited by Donndorff, *Zool. Beytr.*, i, 1792. [403.]

1788. BLUMENBACH, J. F. D. Joh. Friedr. Blumenbachs | der Med. Prof. ord. zu Göttingen | Handbuch | der | Naturgeschichte. | — | Mit Kupfern. | — | Multa fiunt eadem sed aliter. | Qvintilian. | — | Dritte sehr verbesserte Ausgabe. | — | Göttingen, | bey Johann Christian Dieterich, | 1788. sm. 8°. pp. i–xvi, 1–715, pll. i–iii.

IX. *Palmata*, pp. 137–143. Includes *Trichecus Manatus*, p. 143.

XII. *Cetacea*, pp. 143–147. **1.** *Monodon Narwhal*, p. 144; **2.** *Balaena Mysticetus*, p. 144; **3.** *B. Physalus*, p. 146; **4.** *Physeter Macrocephalus*, p. 146; **5.** *Delphinus Phocaena*, p. 147; **6.** *D. Delphis*, p. 147; **7.** *D. Orca*, p. 147. [404.]

1788. GMELIN, J. F. Caroli a Linné, | . . . [=titles, etc., 4 lines] | Systema | Naturae | per | Regna tria Naturae, | secundum | Classes, Ordines, | Genera, Species, | cum | Characteribus, differentiis, synonymis, locis. | Tomus I. | — | Editio decima tertia, aucta, reformata. | — | Cura | Jo[annis]. Frid[erico]. Gmelin, | . . . [titles, 4 lines] | — | Lipsiae, 1788. | Impensis Georg. Emanuel. Beer. 8°. 7 ll. unpaged, pp. 1–500. Mammalia, pp. 1–232.

Sirenia [<ii *Bruta*], arranged under the genus *Trichechus* (pp. 59–61). **1.** *T. Rosmarus* = Walruses, p. 59; **2.** *T. Dugong* = Indian Walrus, Pennant, p. 60; **3.** *T. Manatus*, *α. australis* ("Habitat in mari africano et americano"), p. 60; **3a.** *T. Manatus*, *β. borealis* (= *Rhytina gigas*), p. 61.

Cete, pp. 222–233; genera 37–40 = 4; species 15, to wit: **1.** *Monodon Monoceros*, p. 222; **2.** *Balaena Mysticetus*, p. 223; **3.** *B. Physalus*, p. 224; **4.** *B. Boops*, p. 225; **5.** *B. gibbosa*, p. 225; **6.** *B. Musculus*, p. 226; **7.** *B. rostrata*, p. 226; **8.** *Physeter Catodon*, p. 226; **9.** *P. macrocephalus*, p. 227; **10.** *P. microps*, p. 228; **11.** *P. Tursio*, p. 229; **12.** *Delphinus Phocaena*, p. 229; **13.** *D. Delphis*, p. 230; **14.** *D. Orca*, p. 231; **15.** *D. Leucas*, p. 232. [405.]

1789. "BECHSTEIN, JOH. MATTH. Gemeinnütz. Naturgesch. Deutschlands, nach allen 3 Reichen. 4 Bde. Mit 65 Kpfr. gr. 8°. Leipzig, 1789–95."

"1. Bd. welcher die nöthigen Vorkenntnisse u. die Geschichte der Säugethiere enthält. Mit 16 Kpfrtaf. 1789."

Not seen; title from Carus and Engelmann. An improved later edition is said to have appeared in 4 vols. 1801–09 (Mammals, 1801). [406.]

1789. BONNATERRE, —. Tableau | Encyclopédique | et Méthodique | des trois Règnes de la Nature, | Dédié et présenté a M. Necker, Ministre d'État, | & Directeur Général des Finances. | — | Cetologie. | — | Par M. l'Abbé Bonnaterre. | . . . . [= motto, 2 lines]. | [Vignette.] | A Paris, | Chez Panckoucke, Libraire, Hôtel

1789. BONNATERRE—Continued.

de Thou, rue des Poitevins. | — | M. DCC. LXXXIX. | Avec Approbation et Privilége du Roi. | 4°. pp. i–xlj, 1–28, pll. 1–12. <*Encyclopédie Méthodique*, tome 183.

Tome 183 of the *Encyclopédie Méthodique* also includes:

Tableau | Encyclopédique | et Methodique | des trois Règnes de la Nature. | — | Quadrupèdes et Cétacés. | Par MM. Daubenton et Desmarest. | [It bears the same imprint as tome 182, and the date M. DCCCXXVI (1826)]. 4°. pll. 1–112, pll. suppl. 1–14 = 126 pll. *See* 1822. DESMAREST, A. G.

"Le Recueil des planches de *l'Encyclopédie*, destinées à représenter les principales espèces de mammiferes, a été publié, sans texte, il y a environ trente ans." *Avertissement*, tome 182, 1820, p. v.

"Avertissement," pp. iii–vi, reviewing the history and difficulties of the subject; "Introduction," pp. vii–xli, defining the "Différences entre les cetacés et les poissons" (pp. vii, viii), and describing in detail the different parts of the various types of Cetaceans (pp. viii–xx), their distribution, migrations, habits, etc. (pp. xx–xxiii), and the Whale-fishery, as carried on by different nations (pp. xxiii–xxx). Then follows "Précis anatomique des Cetacés, Avec l'explication de quelques mots techniques qu'on emploie ordinairement dans les descriptions" (pp. xxxi–xl), with "Table méthodique des Cetacés" (p. xli), giving the characters of the "Classes" and "genres."

Cetologie, pp. 1–28. Genn. 4; spp. 26. Première Classe. Baleines. Ier. Genre. Baleine, *Balena*. Linn., p. 1. **1.** La Baleine-Franche, *B. Mysticetus*, p. 1, pl. ii, fig. 1, from Martens = *Balæna mysticetus*; **2.** Le Nord-Caper, *B. Glacialis*, p. 3 = *B.* "*biscayensis*"; **3.** Le Gibbar, *B. Physalus*, p. 4, pl. ii, fig. 2, from Martens = *Physalus antiquorum*; **4.** La Baleine-tampon, *B. Nodosa*, p. 5 = ? *Balænoptera rostrata*; **5.** La Baleine a bosses, *B. Gibbosa*, p. 5 = *Agaphelus gibbosus*, Cope; **6.** La Jubarte, *B. Boops*, p. 6, pl. iii, fig. 2, from Sibbald = ? *Megaptera longimana*; **7.** Le Rorqual, *B. Musculus*, p. 7, pl. iii, fig. 1, from Sibbald = ? *Physalus antiquorum*; **8.** La Baleine a bec, *B. Rostrata*, p. 8, pl. iv, from Hunter = *Balænoptera rostrata*.

Seconde Classe. Monodons. Ier. Genre. Monodon, *Monodon*. Linn., p. 9; **9.** La Narhwal, *M. Monoceros*, p. 10, pl. v, fig. 1, animal, figg. 2, 3, bidentate skull, from Cope = *M. monoceros*; **10.** L'Anarnak, *M. Spurius*, p. 11 = ? *Hyperoodon bidens*.

Troisième Classe. Cachalots. Ier. Genre. Cachalot, *Phiseter*. Linn., p. 12; **11.** Le Grand Cachalot, *P. Macrocephalus*, p. 12, pl. vi, fig. 1, pl. vii, fig. 2, original = *Physeter macrocephalus*; **12.** Le petit Cachalot, *P. Catodon*, p. 14, pl. vi, fig. 4, tooth = *Physeter macrocephalus* juv.; **13.** Le Cachalot trumpo, *P. Trumpo*, p. 14, pl. viii, from Robertson = *Physeter macrocephalus*; **14.** Le Cachalot cylindrique, *P. Cylindricus*, p. 16, pl. vii, fig. 1, from Anderson = *Physeter macrocephalus*; **15.** Le Cachalot Microps, *P. Microps*, p. 16 = *Physeter macrocephalus*; **16.** Le Cachalot Mular, *P. Mular*, p. 17, pl. viii, fig. 5, tooth = *Physeter macrocephalus*.

Quatrième Classe. Dauphins. Ier. Genre. Dauphin, *Delphinus*. Linn., p. 18; **17.** Le Marsouin, *D. Phocæna*, p. 18, pl. x, fig. 1, copy of an early figure; **18.** Le Dauphin, *D. Delphis*, p. 20, pl. x, fig. 2, from Klein = *Delphinus delphis*; **19.** Le Nésarnak, *D. Tursio*, p. 21, pl. xi, figg. 1, 2, from Hunter = *Tursio truncatus*; **20.** L'Epaulard, *D. Orca*, p. 21, pl. xii, fig. 1, from Hunter = *Orca gladiator*; **21.** L'Epaulard ventru, p. 23, pl. xii, fig. 2, from Hunter = ? *Orca* sp.; **22.** L'Épée de Mer, *D. Gladiator*, p. 23 = *Orca gladiator*; **23.** Le Béluga, *D. Albicans*, p. 24 = *Beluga catodon*; **24.** Le Dauphin a deux dents, *D. Bidentatus*, p. 24, pl. xi, fig. 3, from Hunter, altered = *Hyperoodon bidens*; **25.** Le Butskopf, *D. Butskopf*, p. 25 = *H. bidens* (not the Butskopf of the Dutch and Germans, which is an *Orca*); **26.** Le Dauphin fères, *D. Feres*, p. 27 = ? *Orca gladiator*.

Balæna nodosa, *Phiseter trumpo*, *P. cylindricus*, *P. mular*, *Delphinus bidentatus*, *D. butskopf*, *D. feres*, spp. nn.

Systematic names are given to 25 species, 7 of them new. Bonnaterre's memoir, although essentially a compilation, became at once the authority on the subject, and was so recognized till the appearance of Lacépède's work in 1804. With one exception (*Physeter macrocephalus*) the figures of the animals are all copies from those of previous authors, notably Sibbald, Anderson, and Hunter. The memoir, however, may be taken as the best presentation of the general subject up to that date, and is especially important for the considerable number of new names introduced. [407.]

1789? "GROOT, J. J. Beknopt en getrouw Verhael, van de reys van Commandeur Jeldert Jansz. Groot, uit Texel na en Groenlandt. Desselfs verblijf op de kust van Oud-Groenlandt, nae het verongelukken van deszelfs onderhebbend schip, voorgevallen in Anno 1777 en 1778. Amsterdam, Wed. van A. van Rijschooten en zn. 4°, (16 pag.)."

Not seen; from Bosgoed, *op. cit.*, p. 237, no. 3467. [408.]

1789. **Merck, Henry.** Mémoire sur les Cétacés. <*Hist. et Mém. de la Soc. des Sci. phys. de Lausanne*, ii, 1784–86 (1789), pp. 339–344, pl. vii.

Pl. vii, fig. 1, crâne de la baleine ordinaire; fig. 2, du monodon; fig. 3, du dauphin; fig. 4, du physeter; figg. 5, 6, de une espèce de baleine inconnue [=*Hyperoodon*]. [409.]

1789. [**Wheatley, John**, *and others*.] [Certificates of Capture of Whales by use of the Gun-Harpoon.] <*Trans. London Soc. Encour. Arts, Man., and Com.*, vii, 1789, pp. 175–186.

Gives accounts of the capture of various Whales, with generally a statement of the "length of bone"; one Whale is stated to have had "thirteen feet ten inch bone"; others had "ten feet bone," "eleven feet bone," etc. [410.]

1790. **Anderson**, [—], *and* **Coombe** [—]. Anderson's | Historical and Chronological Deduction | of the | Origin of Commerce, | from the earliest accounts, | containing | an History | of the | great commercial interests | of the | British Empire, | to which is prefixed, | an introduction, | exhibiting | a view of the ancient and modern state of | Europe; of the importance of our Colonies; | and of the commerce, shipping, manu- | factures, fisheries, &c., | of | Great Britain and Ireland; | and their influence on the landed interest. | with an | Appendix, | containing | the modern politico-commercial geography of | the several countries of Europe. | Carefully Revised, Corrected, and continued to the year 1789, | By Mr. Coombe. | — | In six volumes. | Vol. I[-VI]. | — | Dublin: | Printed by P. Byrne. | — | M.DCC.XC. 6 vols. 8°.

The treatment of the Whalefishery is chronological, and therefore runs through the work and cannot be conveniently cited definitely. The references are generally brief, consisting of summaries, necessarily at second-hand. Vols. i-iii contain the "original part of the historical and chronological work of Mr. Anderson"; vol. iv consists of the "Appendix" (pp. 1-208) and "An Alphabetical and Chronological Index" (pp. 209–577) to Anderson's work; vols. v and vi contain the continuation by Mr. Coombe. The copious and well-arranged indexes greatly facilitate reference to the subjects treated. [411.]

1790. "**Bowens, Jac.** Nauwkeurige beschryving der beroemde zeestad Oostende, van haeren oorsprong af tot het jaar 1787. Brugge, J. de Busscher. 1790. 2 dln. 4°."

"Zie aldaar: Oesterbank wanneer gemaakt. II, bl. 139. Reglementen raekende de visscherijen binnen Oostende. I, bl. 21, 28, 30. II, 143. Acht walvisschen aangespoeld. I, bl. 17. Walvischvangst na Groenland, opgeregt te Brugge. II, bl. 37, 150."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 234, no. 3432. [412.]

1790–95. "**Donndorff, Joh. Aug.** Natur u. Kunst. Ein gemeinnütz. Lehr- u. Lesebuch. 4 Bde. 8°. Leipzig, 1790–95."

Not seen; title from Carus and Engelmann. [413.]

1791. **Anon.** ? [*or* **Jong, H. de, H. Koebel,** *and* **M. Salieth.**] "Nieuwe Beschrijving der Walvischvangst en der Haringvisscherij. Met XXII fraaije platen en kaarten vercierd. Amsterdam, J. Roos, 1791. 4 dln. 4°."

Not seen; from Bosgoed (*op. cit.*, p. 250, no. 3584), who gives it as a new edition of "De walvischvangst met veele bijzonderheden," etc., 1784–86, *q. v.*

Scoresby gives this work as "door H. de Jong, H. Koebel, en M. Salieth."—*Arct. Reg.*, ii, p. 153, note. There is a French translation by B. de Reste, Paris, 1799, entitled "Histoire des Pêches," etc., *q. v.* [414.]

1791. **Fawkener, W.**, *and* **Lords of the Committee of Council**, *etc.* On the production of Ambergris. A Communication from the Committee of Council appointed for the Consideration of all Matters relating to Trade and Foreign Plantations; with a prefatory Letter from *William Fawkener*, Esq. to Sir *Joseph Banks* Bart. P. R. S. <*Philos. Trans. Lond.*, lxxxi, pt. 1, art. ii, 1791, pp. 43–47.

Mainly a series of questions by the Council, with answers by Capt. Joshua Coffin, examined by the Council in reference to the circumstances of his finding ambergris in a Whale. [415.]

1791. **Gumilla, J.** Historia Natural, | Civil y Geografica | De las Naciones | Situadas en las Riveras | Del Rio Orinoco. | Su Autor | El Padre Joseph Gumilla, |

1791. GUMILLA, J.—Continued.
Misionero que fué de las Misiones del Orinoco, | Meta y Casanare. | Nueva Impresion: | Mucho mas correcta que las anteriores, y adornada con ocho | láminas finas, que manifiestan las costumbres y ritos de | aquellos Americanos. | Corregido por el P. Ignacio Obregón, de los Clérigos Menores: | Tomo I. | Barcelona: | En la Imprenta de Carlos Gibert y Tutó | Año MDCCLXXXXI. 2 vols. sm. 4°. pp. i–xvi, 1–360, map and pll.

Variedad de pecos y singulares industrias de los Indios para pescar; piedras y huesos medicinales que se han descubierto en algunos pescados. Tom. i, cap. xxi, pp. 277–292.—Manati, pp. 281–289. (See *antea*, edd. of 1745 and 1758.) [416.]

1791. [HULLOCK, TYZACK, JOHN WHEATLEY, *and others.*] [Accounts and Certificates of taking Whales with the Gun-Harpoon.] <*Trans. London Soc. Encour. Arts, Man., and Com.*, ix, 1791, pp. 158–166. [417.]

1791. [LONDON SOCIETY, *etc.*] [Award of Premium for improved Gun Harpoon.] <*Trans. London Soc. Encour. Arts, Man., and Com.*, ix, 1791, pp. 167, 168, pl. iv.

Account of "Mr. Charles Moore's improved Harpoon Gun, with figures of the gun." [418.]

1791. "MEARES, J. Voyages | Made in the Years 1788 and 1789, | from China to the N. W. coast of America: | with | an introductory narrative | of | a voyage | Performed in 1786, from Bengal, | in the Ship Nootka. | To which are annexed, | observations on the probable existence | of | a north west passage. | And some account of | the trade between the north west coast of America | and China; and the latter country and | Great Britain. | — | By John Meares, Esq. | — | Vol. I [II]. | — | London: | printed at the Logographic Press; | and sold by | J. Walter, No. 169, Piccadilly, opposite Old Bond Street. | 1791. 2 vols. sm. 8vo. pp. i–xii, i–lxxii, 1–363, maps, pll. Vol. II, 2 p. ll., pp. 1–332 + 32 unpaged ll. (Appendix), maps."

Not seen; title from Coues, *Birds Col. Vall.*, App., 1878, p. 589. For reference to the cetological matter, see the French version under 1795. [419.]

1791. OVERBEEK, L. "Vinvis, gestrand tusschen Wijk aan Zee en Zandvoort. 1791. Door L. Overbeek. br. folio."

From Bosgoed, *op. cit.*, p. 176, no. 2781. [420.]

1791. RÉDACTEUR. Mémoire [par C. Cuvier] sur l'organe de l'ouie dans les cétacés. p. 99. <*Bull. de la Soc. philom.*, 1791, p. 99.

Notice. [421.]

1791 (*circa*). SCHWEDIANER, —. ["Ueber den Ursprung des Ambers."] <*Samml. zur Phys. und Naturgesch.*, iii, (1791?), p. 336. Aus d. *Phil. Trans.*, lxxiii, pp. 226 *et seqq.*

Not seen; title based on a reference in Donndorff, *Zool. Beytr.*, i, 1792, p. 777. [422.]

1792. BUFFON, [G. L. LECLERC DE]. Histoire | Naturelle | des | Quadrupedes. | — | Par M. L. Compte de Buffon. | — | Tome septième. | Avec Planches. | — | [Design.] Berne, | chez La Nouvelle Société Typographique. | — | M. DCC. XCII. 8°. ll. 2, pp. 5–296.

Les Phoques, les Morses et les Lamantins, pp. 136–203, pll. xv–xvii. Le Dugong, pp. 181–185. Le Lamantin, pp. 185–203, pl. xvii.

The text is the same as that of the original edition (1765, *q. v.*), with the omission of Daubenton's anatomical observations. The additions made in the "Supplément" (vol. vi, 1782) are not included. [423.]

1792. DONNDORFF, J. A. Zoologische | Beyträge | zur | XIII. Ausgabe | des Linnéischen | Natursystems | von | Johann August Donndorff. | — | Erster Band. | Die Säugthiere. | — | Leipzig, | in der Weidmannschen Buchhandlung. | 1792. [Zweyter Band | Die Vögel. | Erster Thiel, 1794. Zweyter Theil, 1795.] 8°. pp. i–xx, 1–840, ll. 30.

Siebente [und letzte] Ordnung. *Cete* (Säugende Seethiere), pp. 755–790. **1.** ***Monodon Monoceros***, p. 755 (β. ***Spurius?*** Der Anarnak? p. 760); **2.** ***Balaena Mysticetus***, p. 761 (β. ***Islandica***, et γ. ***Maior***, p. 765); **3.** ***B. Physalus***, p. 765; **4.** ***B. Boops***, p. 767; **5.** ***B. Gibbosa***, p. 769; **6.** ***B. Musculus***, p. 770; **7.** ***B. Rostrata***, p. 772; **8.** ***Physeter Catodon***, p. 773; **9.** ***P. Macrocephalus***,

1792. **Donndorff, J. A.**—Continued.

p. 774; **10.** *P. Microps*, p. 778; **11.** *P. Tursio*, p. 780; **12.** *Delphinus Phocaena*, p. 781; **13.** *D. Delphis*, p. 784; **14.** *D. Orca*, p. 786; **15.** *D. Leucas*, p. 789.

D. leucas, nom. sp. n. = *D. albicans*, Fabric.

Sirenia. All the then known Sirenians are arranged with the Walrus in the genus *Trichechus*, forming the second species, *T. Manatus*, pp. 128–131. [424.]

For fullness and care in citation of bibliography this work is comparable with Erxleben's *Syst. Reg. Anim.* No diagnoses are given of the species, but there is noteworthy commentary in foot-notes.

1792. **Kerr, Robert.** The | Animal Kingdom, | or | Zoological System, | of the Celebrated | Sir Charles Linnæus; | — | Class I. | Mammalia: | containing | a complete Systematic Description, Arrangement, and Nomencla- | ture, of all the known Species and Varieties of the Mammalia, | or Animals which give suck to their Young; | being a translation of that part of the | Systema Naturæ, | as lately published, with great improvements, | By Professor Gmelin of Goettingen. | — | Together with | Numerous Additions from more recent zoological writers, | and illustrated with Copperplates: | — | By Robert Kerr, F. R. & A. SS. E. | Member of the Royal College of Surgeons, and of the Royal Physical Society, | and Surgeon to the Orphan Hospital of Edinburgh. | — | London: | Printed for J. Murray, N°. 32. Fleet-street; | and | R. Faulder, N°. 42. New Bond Street. | — | 1792. 4°. [Part I, Mammals.] pp. i–xii, ll. 14, pp. 1–400. The | Animal Kingdom, | or | Zoological System, | of the celebrated | Sir Charles Linnæus. | — | Vol. I, Part II. [Or] The | Animal Kingdom. | — | Class II. | Birds. l. 1, pp. 401–644, pll. 3?

This is a rare work in American libraries. The only copy I have handled (that in the library of the Boston Society of Natural History) is obviously imperfect, lacking pp. 433–468, and apparently several of the plates, and ending abruptly with *Corvus brachyurus* (p. 376 of Gmelin's edition of the "Systema Naturæ"), with a catch-word for the next page. The plates are unnumbered, and there is no list of them in the work, nor, apparently, any reference to them in the text, so that the exact number cannot be given from the copy of the work at hand. The figures on the plates, however, have numerals referring to the current number of the species in the text. The work is an important one in respect to nomenclature, since a number of systematic names originated here which have been currently attributed to Shaw and Turton. *Cf.* Oldfield Thomas, *Ann. and Mag. Nat. Hist.*, 5th ser., vol. iv, 1879, pp. 396–397. Also, J. A. Allen, *Hist. North Amer. Pinnipeds*, 1880, p. 434.

It is noteworthy that a trinomial system of nomenclature was adopted by Kerr for the designation of varieties, as has recently been done by Schlegel, and still later by most American ornithologists and mammalogists.

[Order] vii. Cete, pp. 355–365, spp. 785–808, pl. facing p. 355, spp. nn. 785, 796, 802, 805.

1. *Monodon Monoceros*, p. 355, fig.; **2.** *Balæna Mysticetus*, p. 356; **2α.** *B. Mysticetus groenlandica*, p. 356; **2β.** *B. Mysticetus islandica* (= Nordkapper, Egede, etc.), p. 357; **2γ.** *B. Mysticetus major*, p. 357; **3.** *B. Physalis*, p. 358; **4.** *B. Boops*, p. 358; **5.** *B. gibbosa*, p. 359; **5α.** *B. gibbosa gibbo unico*, p. 359; **5β.** *B. gibboso gibbis sex*, p. 359; **6.** *B. Musculus*, p. 359; **7.** *B. rostrata*, p. 360; **8.** *Physeter Catodon* (= *Beluga catodon*), p. 360; **9.** *P. macrocephalus*, p. 360, fig.; **9α.** *P. macrocephalus niger*, p. 369; **9β.** *P. macrocephalus albicans* (= *Beluga catodon*), p. 361; **10.** *P. microps*, p. 361; **10α.** *P. microps falcidentatus*, p. 361; **10β.** *P. microps rectidentatus*, p. 362; **11.** *P. Tursio*, p. 362; **12.** *Delphinus Phocæna*, p. 362, fig.; **12α.** *D. Phocæna albus*, p. 363; **12β.** *D. Phocæna fuscus*, p. 363; **13.** *Delphinus Delphis*, p. 363, fig.; **14.** *D. Orca*, p. 364; **14α.** *D. Orca ensidorsatus*, p. 364; **15.** *Delphinus leucas*, p. 364 = 15 spp. + 11 varr. [425.]

1792. **Wheatley, John.** An Account of the Whales shot with the Harpoon-Gun, by the undermentioned Harpooners, in the Ship *Queen Charlotte*, of *London*, under my command, in *Davis's* Straights this present year [1791]. < *Trans. London Soc. Encour. Arts, Man., and Com.*, x, 1792, pp. 238–241.

In the same connection is a list of premiums paid for the capture of Whales with the harpoon-gun in the year 1791 (p. 238), and certificates of capture relating to the same (pp. 241–245). [426.]

1793. **Bell, John.** Observations on throwing a Gun-Harpoon. < *Trans. London Soc. Encour. Arts, Man., and Com.*, xi, 1793, pp. 185–192, pl. v.

The "Observations" are preceded by a letter from Mr. Bell to the society and followed by "Description of the Plate of Mr. Bell's improved Gun and Harpoon." Fig. 1, the Gun fitted for firing; fig. 2, the form of the Harpoon. [427.]

1793. "DONNDORFF, JOH. AUG. Handbuch der Thiergeschichte. Nach den besten Quellen u. neusten Beobachtungen zum gemeinnütz. Gebrauche. gr. 8°. Leipzig, 1793."

Not seen; title from Carus and Engelmann. [428.]

1793. [LONDON SOCIETY, *etc.*] [Premium for] Gun for throwing Harpoons, [and for] Taking Whales by the Gun-Harpoon. <*Trans. London Soc. Encour. Arts, Man., and Com.*, xi, 1793, pp. 335, 336.

These offers of premiums were annually renewed by the society for many years. See subsequent volumes of the society's *Trans.* [429.]

1793. "PASTEUR, J. D. Beknopte natuurlijke historie der zoogende dieren. Leyden, Honkoop en Mortier, 1793. 3 dln. met pl. 8°."

"Zie aldaar: iii, bl. 305–393: Zoogende waterdieren."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 170, no. 2689. [430.]

1793. ST. JOHN [DE CRÈVECŒUR], J. HECTOR. Letters | from an | American Farmer, | describing | certain provincial situations, | manners, and customs, | and conveying | some idea of the state | of the people of | North America. | — | Written to a friend in England, | By J. Hector St. John, [de Crèvecœur]. | A Farmer in Pennsylvania. | — | Philadelphia: | From the Press of Matthew Carey. | March 4,—M. DCC. XCIII. 12°. pp. i–viii, 9–240.

Substantially the same as the *ed. prin.*, 1782, with, however, the omission of the maps and the references to them. The "letters" relating to the Nantucket Whalefishery, etc., are at pp. 118–136. For the character of the matter see ed. of 1782. [431.]

1793. SINCLAIR, JOHN. The | Statistical Account | of | Scotland. | Drawn up from the Communications | of the | Ministers | of the | Different Parishes. | — | By Sir John Sinclair, Bart. | — | Volume Fifth. | "Ad consilium de republica dandum, caput est nosse rempublicam." | Cicero de Orat. lib. ii. | — | Edinburgh: | printed and sold by William Creech; | . . . . [=5 lines, names of other booksellers]. | — | M,DCC,XCIII. 8°. pp. i–vii, 1–591.

A "list of the different kinds of Fish, which are found in the river and frith of Clyde," pp. 535–538. A nominal list, including the following species of Cetaceans (p. 533): Blunt-headed Whale, *Physeter microps;* Grampus, or Bucker, *Delphinus orca;* Porpoise, or Pellock, *D. phocæna.* [432.]

1793–96. "EBERT, JOH. JAC. Naturlehre (u. Naturgesch.) für die Jugend. 3 Bde., 3 Aufl. 8°. Leipzig, 1793–96. (1, 2 Aufl., 1776–87.)"

Not seen; title from Carus and Engelmann. Cited by Donndorff and others. [433.]

1794. ANON. Progress of the Whale Fishery at Nantucket. <*Coll. Mass. Hist. Soc.* for the year 1794, iii, 1794, p. 161.

A brief chronological history, 1690 to 1785. [434.]

1794. MACY, Z. A short Journal of the first settlement of the island of Nantucket, with some of the most remarkable things that have happened since, to the present time. By Zaccheus Macy. <*Coll. Mass. Hist. Soc.* for the year 1794, iii, 1794, pp. 155–156 (*i. e.*, 160).

Of the Whale Fishery, pp. 157, 158. A brief but important original account of the origin of the Nantucket Whale-fishery. [435.]

1794. PALLAS, S. P., *et* J. B. LAMARCK. Voyages | du | Professeur Pallas, | dans plusieurs Provinces | de l'Empire de Russie | et | dans l'Asie septentrionale; | Traduits de l'allemand par le C. Gauthier | de la Peyronie. | Nouvelle édition, | Revue et enrichie de Notes par les CC. Lamarck, profes- | seur de Zoologie au Muséum national d'Histoire naturelle; | et Langlès, Sous-Garde des Manuscrits de la Biblio- | thèque nationale, pour les Langues Arabe, Persane, Tatare- | Mantchou, &c. | Tome Premier [-huitième]. | — | A Paris, | Chez Maradau, Libraire, rue du Cimetière | André-des-Arçs, nº. 9. | — | L'An II de la République [=1794]. 8 vols. 8°.

The title of vol. viii varies from the above by substitution of the following between "Nouvelle édition" and the number of the volume:

Appendix, | Contenant les descriptions des Animaux et des Végétaux observés | dans les Voyages du Professeur Pallas, et cités ou mentionnés | dans les

1794. **Pallas, S. P.**, *et* **J. B. Lamarck**—Continued.
volumes précédens; | Avec des Notes et Observations par le C. Lamarck, | Professeur de Zoologie au Muséum national d'Histoire naturelle.

"Description du Poisson blanc," vol. v, pp. 192–197 (par M. Pallas). "*Delphinus leucas* [Dauphin blanc], Le Bélouga de mer ou poisson blanc, pl. lxxix," vol. vii, pp. 25, 26 (par M. Lamarck). [436.]

1795. **Forster, J. R.** Faunula Indica | id est | Catalogus animalium | Indiae Orientalis | quae hactenus | Naturae curiosis | innotuerunt; | concinnatus | a | Joanne Latham, | Chirurgo Dartfordiae Cantii, | et | Hugone Davies, | pastore in aber | provinciae Caernarvon, | Secundis curis editus, correctus et auctus | a Joanne Reinholdo Forster, | LL. Med. et phil. D. et LL. AA. M. Med. Philos. et imprimis Hist. Nat. | et Rei Metallicae. Prof. P. O. in Universitate | Litteraria Halensi. | — | Halae ad Salam, | impensis Joannis Jacobi Gebaueri. | CIↃIↃCCLXXXXV. 2°. ll. 3, pp. 1–38.

Ordo ix. Cete, p. 5 = *Trichechus Manatus*, *Trichechus Dugong*. *Phoca ursina*, *Delphinus Phocaena*, *Delphinus Delphis*. Merely a nominal list. [437.]

1795. **Hearne, S.** A | Journey | from | Prince of Wales's Fort in Hudson's Bay, | to | the Northern Ocean. | Undertaken | by order of the Hudson's Bay Company, | for the Discovery | of Copper Mines, A Northwest Passage, &c. | In the Years 1769, 1770, 1771, & 1772. | — | By Samuel Hearne. | — | London: | printed for A. Strahan and T. Cadell: | And Sold by T. Cadell Jun. and W. Davies, (Successors to | Mr. Cadell,) in the Strand. | 1795. 4°. pp. i–xliv, 1–458, map and pll. i–viii.

Sea Unicorn, pp. 391, 392. Black Whale (three killed in 20 years as far south as Churchill River), pp. 392, 393. White Whales, pp. 393–395.

There is a later edition, Dublin, 1796, 8°. Also translations in French (Paris, 1799, 2 vols., 8°), Dutch (Hague, 1798, 2 vols., 8°), and German (Berlin and Halle, 1797, 8°). (*See* Sabin, *Bibl. Amer*, viii, pp. 188, 189, nos. 31181–31186). [438.]

1795. **Meares, J.** Voyages | de la Chine | a la côte Nord-Oust | d'Amerique, | faits dans les années 1788 et 1789; | Précédés de la relation d'un autre Voyage exécuté en | 1786 sur le vaisseau le Nootka, parti du Bengale; | D'un Recueil d'Observations sur la Probabilité d'un | Passage Nord-Ouest; | Et d'un Traité abrégé du Commerce entre la Côte Nord-Ouest et la Chine, etc. etc. | Par le Capitaine J[ohn]. Meares, Commandant | le Vaisseau la Felice. | Traduits de l'Anglois | Par J. B. L. J. Billecocq, Citoyen Français. | Avec une Collection de Cartes géographiques, Vues, Marin | Plans et Portraits, gravés en taille-douce. | — | Tome premier[-troisième]. | — | A Paris, | Chez F. Buisson, Libraire, rue Hautefeuille, n°. 20. | — | An 3ᵉ. [1795] de la République. 3 vols. 8°. Vol. i, pp. i–xxiv, 1–391. Vol. ii, ll. 2, pp. 1–386. Vol. iii, ll. 2, pp. 1–371.

La pêche de la baleine est la branche de commerce la plus avantageuse qu'offre la côte nord-ouest d'Amerique, vol. i, pp. 163–166. Description de la manière dont les naturels de Nootka tuent la baleine, etc., vol. iii, pp. 21–24.

The copy of this work examined (Harvard College Libr.) lacks the collection of maps, views, etc., called for in the title. [439.]

1795. "**Savary, J.** Dictionnaire universel de commerce, d'histoire naturelle et des arts et metiers. Nouvelle édition. Copenhague, C. A. Philibert. 1795. 5 dln. folio."

". . . . Pêche de la Baleine, i, bl 310–316."

Not seen; title from Bosgoed, *op. cit.*, pp. 229, 247, nos. 3394, 3554. [440.]

1795. **Walcott, S.** A | New and complete | Natural History | of |

Quadrupeds,	Reptiles,	Fossils,	Winds,
Beasts,	Insects,	Minerals,	Sun,
Birds,	Waters,	Vegetables,	Moon,
Fishes,	Earth,	Shells,	Planets, &c., &c.

Containing | a New History and Description | of the several Classes and Species of Animals which inhabit | The Air, the Earth, and the Water, | in the several parts of the Universe. | . . . [=21 lines, giving further description of

1795. WALCOTT, S.—Continued.
contents.] | Forming an | Universal Display of Nature, | Animate and Inanimate. | . . . [=3 lines]. | — | By Sylvanus Walcott, Esq., F. R. S. | Assisted by many gentlemen of eminence. | — | Elegantly embellished with a superb group of folio prints: | Representing several Thousand different Objects . . . [=2 lines]. | — | London: | Printed for Alex. Hogg, No. 16, in Paternoster-Row, and sold by all the Booksellers of | Bath, Bristol, . . . [=8 lines, names of other towns in alphabetical order]. No date. fol. pp. 1–542, pll. i–clix [?]

The plates are not nearly all numbered; the number of the last one is clix. There is no date on the title-page, but at the bottom of the frontispiece page is engraved in small letters: Published March 21, 1795, by Alex. Hogg, No. 16 Paternoster Row.

Book III. A New and Complete History and Description of Fishes in general, pp. 200–233, pll. lviii, lxi, lxii, +3 pll. unnumbered. Chap. I. Natural History of Fishes of the Cetaceous kind, viz.: The Whale and its varieties, the Cachalots, the Dolphin, the Grampus, and the Porpus, pp. 202–206. **1.** Greenland Whale, pp. 202–204, pl. lxii, fig. 66. **2.** Pike-headed Whale, p. 204. **3.** Round-lipped Whale, p. 204. **4.** Cachalot, or Spermaceti Whale, pp. 204, 205. **5.** Great-headed Cachalot. **6.** Round-headed Cachalot, p. 205. **7.** Dolphin, **8.** Grampus, and **9.** Porpus, pp. 205, 206. There is a figure of the Narwhal, but apparently no description. The work is of most interest as a literary curiosity, being a popular compilation, of no scientific value. [441.]

1796. ABERNETHY, J. Some particulars in the Anatomy of a Whale. <*Philos. Trans. Lond.*, [lxxxvi], pt. 1, art. ii, 1796, pp. 27–33.

On the structure and function of the lymphatic glands. [442.]

1796. "POSSELT, K. F. Ueber den Grönländischen Wallfischfang, herausgegeben von *A. Niemann*. Kiel, 1796. 8°."

Not seen; from Bosgoed, *op. cit.*, p. 246, no. 3646.' [443.]

1796. STEDMAN, J. G. Narrative, | of a five years' expedition against the | Revolted Negroes of Surinam, | in Guiana, on the Wild Coast of | South America; | from the year 1772, to 1777: elucidating the History of that Country, and | describing its Productions, Viz. | Quadrupeds, Fishes, Reptiles, Trees, Shrubs, Fruits, & Roots; | with an account of the Indians of Guiana, & Negroes of Guinea. | By Capt^{n}. J[ohn]. G[abriel]. Stedman. | Illustrated with 80 elegant Engravings, from the drawings made by the Author. | — | Vol. I.[–II]. | — | [Vignette.] . . . . [=quotation, 7 lines]. London. Printed for J. Johnson, S^{t}. Paul's Church Yard, & J. Edwards, Pall Mall. 1796. 2 vols. 4°. Engr. title-page, maps and plates.

Manatee, vol. ii, p. 175, fig. pl. facing p. 176 (general description). [444.]

1796–1810. BLUMENBACH, J. F. Abbildungen | naturhistorischer Gegenstände | herausgegeben | von | Joh. Fried. Blumenbach. | — | N^{ro} 1–100. | — | Göttingen | bey Heinrich Dieterich. | 1810 | [1796–1810]. 8°.

Cetaceen. No. 44, *Monodon narhwal*, text, 2 pp. "Die Abbildung stellt denjenigen Narhwal vor, der 1736 in der Mündung der Elbe gestrandet war, und ist aus einem periodischen Blatte jener Zeit, den Hamburgischen Berichten von gelehrten Sachen, genommen."

No. 74. *Balæna boops* on plate, *B. rostrata* in text. Original figure of a specimen 52 feet long stranded on the coast of Holland, between Sandfort and Wyk op Zee, in Dec., 1791. Also figure of the head of another example, copied from Sibbald's "Phalainologia."

No. 84. *Physeter macrocephalus*. "Hier diese Abbildung ist von dem meisterhaften grossen aber seltnen Blatte genommen, worauf der vortreffliche Künstler J. Saenredam den 60 Fuss langen Pottfisch der im Dec. 1601 am Ufer von Beverwyk gestrandet war, nach dem Leben vorgestellt hat."

No. 94. *Balæna mysticetus*, "aus Hesel Gerard's *descriptio geographica transitus supra terras Americanas in Chinam.*"

No. 95. *Delphinus delphis*. "Die Abbildung ist von einer trefflichen Zeichnung unsers unvergesslichen G. Forster's genommen."

Eigner Tafel ist mit zwei Seiten von Texte versehen. [445.]

1797. ABERNETHY, JOH. Einige Eigenheiten in der Zergliederung des Wallfisches. <*Reil's Arch. für Physiol.*, ii, 1797, pp. 232–239.

Uebersetzung aus der *Phil. Trans. roy. Soc. London* for 1796, pt. 1, pp. 27 *et seqq.* [446.]

1797. "BORKHAUSEN, MOR. BALTH. Deutsche Fauna, oder kurzgefasste Naturgeschichte der Thiere Deutschlands. 1 Thl. Säugethiere und Vögel. 8°. Frankfurt a. M. 1797."

Not seen; title from Carus and Engelmann. [447.]

1797. CUVIER, G. Sur les narines des cétacés. <*Bull. des Sci. par la Soc. philom. de Paris*, i, 1797, pp. 26–29. [448.]

1797. [CUVIER, G.] Mémoire sur l'organe de l'ouie dans les Cétacés. <*Bull. des Sci. par la philom. de Paris*, i, 1797, p. 99.

Extrait. [449.]

1798. COLNETT, JAMES. A | Voyage | to the | South Atlantic | and round | Cape Horn | into the | Pacific Ocean, | for the purpose of extending the | Spermaceti Whale Fisheries, | and other objects of Commerce, by ascertaining | the Ports, Bays, Harbours, and Anchoring Berths, | in certain Islands and Coasts in those Seas, | at which the ships of the British merchants might be refitted. | — | Undertaken and performed | By Captain James Colnett, | of the Royal Navy, in the ship Rattler. | — | London: | Printed for the Author, | by W. Bennett, Marsham Street, Westminster. | . . . . [=3 lines, names of booksellers]. | — | 1798. 4°. pp. i–iv, i–vi, i–xviii, 1–179, maps and plates.

Contains *passim* references to Whales seen or taken at various points, etc. Also a plate giving an outline figure of "*Physeter*, or *Spermaceti Whale*, Drawn by Scale, from one killed on the coast of Mexico, August, 1793, and hoisted in on Deck," giving the topography of the animal with reference to manner of cutting in, etc. There is also a half-page of descriptive text (engraved on the plate), with also reference to its food, habits, etc. The figure has been many times copied in works relating to Whaling. [450.]

1798. CUVIER, [G.] Ueber die Nasenlöcher und das Geruchsorgan der Cetaceen; aus einer vom B. Cuvier im Nationalinstitut vorgelesenen Abhandlung. Mag. Encycl. <*Voigt's Mag. der Naturkunde*, i, St. 3, 1798, pp. 34–40.

Uebersetzung aus *Magas. encycl. de Millin*, iii, 1797, pp. 299. [451.]

1798. CUVIER, G. Tableau | élémentaire | de l'Histoire naturelle | des Animaux. | Par G. Cuvier, | de l'Institut national de France, | . . . . [titles, 7 lines]. | — | A Paris, | Baudouin, Imprimeur du Corps législatif et de | l'Institut national, place du Carrousel, N°. 662. | An 6. [=1798.] 8°. pp. i–xvi, 1–710, pll. i–xiv.

Des Mammifères, pp. 83–179: Mammifères Amphibies (pp. 170–173) = *Pinnipedia* + *Sirenia*. *Sirenia*: **1.** *Trichecus dugong*, p. 172; **2.** *Trichecus manatus*, p. 173.

Mammifères Cétacés = *Cetacea* (pp. 173–179): **1.** *Delphinus phocœna*; **2.** *D. delphis*; **3.** *D. orca*, p. 175; **4.** *Physeter macrocephalus* (="Le *cachalot trumpo*, Bonnaterre, *Encycl.*, planches des cétacés, pl. 8, f. 1"); **5.** *P. maximus*, sp. n. (="*idem.*, *ibid.*, pl. 7, fig. 2"), p. 176; **6.** *Balæna mysticetus*, L., p. 177; **7.** *B. physalus*; **8.** *Monodon*, p. 178.

Physeter maximus, sp. n. [452.]

1798. [LONDON SOCIETY, *etc.*] [Premiums offered for "Taking Porpoises" and for "Oil from Porpoises."] <*Trans. London Soc. Encour. Arts, Man., and Com.*, xvi, 1798, pp. 84, 85.

These offers of premiums were annually renewed for a considerable period. See later vols. of these *Trans.* [453.]

1798. THUNBURG, C. P. Beskrifning | på | Svenske Djur. | — | Första Classen, | om | Mammalia | eller Dåggande Djuren, | af | Carl Peter Thunburg, | Riddare af Kongl. Maj:ts Wasa-Orden, | Medicinæ och Botanices Professor | i Upsala. | [Vignette.] | — | Upsala, | Tryckt hos J. F. Edman, K. Acad. Boktr. | 1798. 8°. ll. 6, pp. 1–100.

Cete, pp. 96–100. **1.** *Balæna mysticetus*, p. 96; **2.** *B. physalus*, p. 97; **3.** *Physeter macrocephalus*, p. 98; **4.** *Delphinus phocæna*; **5.** *D. Orca*, p. 99. [454.]

1799. ANON. "Histoire des pêches, des découvertes et des établissemens des hollandois dans les mers du Nord. Ouvrage traduit du Hollandois par B. de Reste. Avec des notes, (28) cartes et figures. Paris, Vve. Nyon, 1799. 3 dln. 8°."

"Eene vertaling van het werk: De Walvischvangst, Amst. 1784 [*q. v.*]. Vermeerderd met aanteekeningen en eene historische verhandeling over Groenland en IJsland, volgens Crantz [*sic*], Egede, de la Peyrère, Horrebow e. a."

Not seen; title and comment from Bosgoed, *op. cit.*, p. 244, no. 3528. [455.]

1800. BUFFON, [G. L.] LECLERC [*Compte de, et* C. S. SONNINI]. Histoire Naturelle, | Generale et Particuliere, | Par Leclerc de Buffon; | Nouvelle Edition, accompagnée de Notes, et dans laquelle | les Supplémens sont insérés dans le premier texte, à la | place qui leur convient. L'on y a ajouté l'histoire | naturelle des Quadrupèdes et des Oiseaux découverts | depuis la mort de Buffon, celle des Reptiles, des Poissons, | des Insectes et des Vers; enfin, l'histoire des Plantes dont | ce grand Naturaliste n'a pas eu le tems de s'occuper. | Ouvrage formant un Cours complet d'Histoire Naturelle; | Redige Par C. S. Sonnini, | Membre de Plusieurs Sociétés Savantes. | Tome Trente-Quatrième. | [Monogram.] A Paris, | de L'Imprimerie de F. Dufart. | — | An VIII. [1800.] 8°. ll. 2. pp. 1–324, l. 1.

Le Dugon, pp. 184–189 (note par Sonnini, p. 184). Le Lamantin, pp. 190–196 (note par Sonnini, p. 191). Le Grand Lamantin du Kamtschatka, pp. 197–211 (note par Sonnini, p. 197). Le Grand Lamantin des Antilles, pp. 212–226 (nôte par Sonnini, p. 212). Le grand Lamantin de la mer des Indes, pp. 327–330 (note par Sonnini, p. 327). Le Petit Lamantin d'Amérique, pp. 231–239 (note par Sonnini, pp. 238, 239). Le Petit Lamantin du Sénégal, pp. 240–246).

The matter here given is that of the original edition (1765, *q. v.*), followed by that of the "Supplément" (vol. vi, 1782, *q. v.*), with notes on the nomenclature of the species by Sonnini. [456.]

1800. LATREILLE, [P. A.]. Exposition methodique des Quadrupèdes, Specialement mentionnés dans cette édition de l'Histoire Naturelle de Buffon. <*Hist. nat. de Buffon*, édit. de Sonnini, xxxvi, an VIII (1800), pp. 251–321.

Onzième Ordre. Les Cétacées, pp. 288, 289. Genn.: *Manatus*, *Delphinus*, *Physeter*, *Monodon*, *Balæna*. [457.]

1800. MARUM, M. VAN. Beschryving van het Bekkeneel van een jongen Walvisch, geplaatst in het Naturalien Cabinet van deeze maatschappy. <*Natuurk. Verh. van de Holl. Maatsch. der Wetensch.*, *Haarlem*, i. Deel, ii. Stuk, pp. 199–202, pl. v.

Description and figure of a skull of a newly-born *Balæna mysticetus*. [458.]

1800. NOËL, S. B. J. Tableau historique | de la Pêche | de la Baleine; | Par S. B. J. Noël, | . . . . [=titles, 7 lines]. | — | A Paris, | Chez Fuchs, Libraire, maison de Cluny, | rue des Mathurins. | — | Thermidor an VIII. [1800.] 8°. pp. 1–108.

Vues générales sur l'antiquité de la pêche de la Baleine, pp. 3–22. Etat présent des pêches de la Baleine chez les diverses nations d'Europe et d'Amérique, qui s'en occupent, pp. 23–52. Réflexions sur les moyens de ranimer en France cette branche précieuse d'économie maritime, pp. 53–96. Preuves et Tableaux relatifs à la pêche de la Baleine, pp. 97–108. [459.]

An historical work of well-known value.

1800. RETZIUS, A. J. Faunae Suecicae | a Carolo à Linné Equ. | inchoatae | Pars prima | sistens | Mammalia, Aves, Amphibia | et Pisces Sueciae | quam | recognovit, emendavit et auxit | Andreas Joannes Retzius | in Academia Lundensi Historiae Naturalis, | Oeconomiae et Chemiae Professor R. O. | — | Cum Tabula aeri incisa. | — | Lipsiae MDCCC. | Apud Siegfried Lebrecht Crusium. 8°. pp. i–x, 1–362, pll. col. (*Fringilla flavirostris* et *F. lutensis*).

Cete, pp. 48–51. **1.** *Monodon Monoceros*, p. 48; **2.** *Balaena Mysticetus*; **3.** *B. Physalus*, p. 49; **4.** *Physeter macrocephalus*; **5.** *Delphinus Phocaena*, p. 50; **6.** *D. Orca*, p. 51. [460.]

1800. V., C. Sur les Ossemens fossiles de la Montagne de St. Pierre, près Maëstricht, par Adr. Camper. <*Bull. de la Soc. philom. de Paris*, ii, no. 42, an 8 de la Repub. (1800), p. 142.

Extrait de cette mémoire, signé "C. V." [461.]

1800–01. SHAW, GEORGE. General Zoology | or | Systematic Natural History | by | George Shaw, M. D. F. R. S. &c. | With plates | from the first Authorities and most select specimens | Engraved principally by | M^{r}. Heath. | [Vignette.] Vol. I[–II, each in 2 parts.] Part 1. | Mammalia. | — | London Printed for G. Kearsley, Fleet Street. | 1800[–1801]. 2 vols. in 4 parts. 8°. The whole work comprises 14 vols., 1800–1826.

Vol. i, pt. 1, 1800, l. 1 (engr. title-page), pp. i–xiii, l. 1, pp. 1–248, pll. i–lxix + lxviii*; pt. 2, 1800, pp. i–viii, 249–552, pll. lxx–cxxi. Vol. ii, pt. 1, 1801, l. 1 (engr. title-page), pp. i–vi, 1–226, pll. cxxii–clxv; pt. 2, 1801, pp. i–vi, l. 1, pp. 229–560, pll. clxvi–ccxxxii + xciv*.

1800–01. **Shaw, George**—Continued.

Trichechus, Walrus [=*Sirenia* + "Arctic Walrus"], vol. i, pt. 1, 1800, pp. 233–248. **1.** *Trichechus Dugong*, p. 239; **2.** *Trichechus Borealis* [=*Rhytina borealis* mainly], pp. 240–244; **3.** *Trichechus Australis* [=*Manatus australis*], pp. 244, 245, pl. lxix; **4.** *Trichechus Manatus*, pp. 245–248 (includes also, as "var.," *Trichechus Clusii*, from the West Indies; *Trichechus Amazonius*, from South America; and *Trichechus ? Hydropithecus*, or Steller's "Sea-Ape."

Order *Cete*. Whales, or Fish-formed Mammalia, vol. ii, pt. 2, 1801, pp. 471–560, pll. ccxxv–ccxxxii. **1.** *Monodon Monoceros*, pp. 473–476, pl. ccxv, animal and skull; **2.** *Monodon Spurius*, pp. 476, 477, from Fabricius; **3.** *Balæna Mysticetus*, pp. 478–490, pl. ccxvi, animal—plate and most of the text from Martens; **4.** *Balæna Physalus*. pp. 490–491, pl. ccxxvii, lower fig., animal, from Martens; **5.** *Balæna Boops*, pp. 492–494, pl. ccxxvii, lower fig.; **6.** *Balæna Gibbosa*, p. 494; **7.** *Balæna Musculus*, p. 495; **8.** *Balæna Rostrata*, p. 496; **9.** *Physeter Macrocephalus*, pp. 497–500, pl. ccxxviii, animal, two figg., from Schreber; **10.** *Physeter Catodon*, p. 501; **11.** *Physeter Microps*, p. 502; **12.** *Physeter Tursio*, p. 503; **13.** *Delphinus Phocæna*, pp. 504–506, pll. ccxxix, lower fig., animal, pl. ccxxx, animal laid open to show internal organs, pl. xxxi, skull, skeleton, and fore limb; **14.** *Delphinus Delphis*, pp. 507–512, pl. ccxxix, upper fig., animal; **15.** *Delphinus Orca*, p. 513, pl. ccxxxii, lower fig., animal; **16.** *Delphinus Bidens*, p. 514, from Hunter; **17.** *Delphinus Rostratus*, p. 514; **18.** *Delphinus Leucas*, pp. 515, 516, pl. ccxxxii, upper fig., animal. Appendix to Whales pp. 517–560, abridged version of Hunter's celebrated memoir on the anatomy of Whales. *See* 1787. Hunter, J.

Delphinus bidens, p. 514, sp. n. = Bottle-nose Whale of Dale, hence *Delphinus bidentatus*, Bonnaterre, 1789; *Delphinus rostratus*, p. 514, sp. n., locality unknown, but "supposed to inhabit the Indian Ocean"; species indeterminable.

The history of the Sirenia and Cetacea is, like most of that part of the work relating to Mammals, purely a compilation. [461.]

1802. **Anon.** A Calculation of the State of the Cod and Whale Fisheries, belonging to Massachusetts in 1763: copied from a Paper published in 1764. <*Coll. Mass. Hist. Soc.*, viii, 1802, pp. 202, 203.

A statistical table, less than a page in length. The following is all that relates to Whale-fishing: "180 sail of Whale-fishing vessels, the exportation to Great Britain amounting, in oil and bone, to £123,366 06" (p. 203). [462.]

1802. **Buffon, [G. L.] Leclerc de**, [*et* C. S. Sonnini]. Histoire naturelle, | générale et particulière, | par Leclerc de Buffon; | Nouvelle Edition, accompagnée de Notes, et dans laquelle | les Supplémens sont insérés dans le premier texte, à la | place qui leur convient. L'on y a ajouté l'histoire | naturelle des Quadrupèdes et des Oiseaux découverts | depuis la mort de Buffon, celle des Reptiles, des Poissons, | des Insectes et des Vers; enfin, l'histoire des Plantes, dont | ce grand Naturaliste n'a pas eu le tems de s'occuper. | Ouvrage formant un Cours complet d'Histoire Naturelle; rédigé par C. S. Sonnini, | Membre de plusieurs Sociétés savantes. | Tome trente-quatrième. [Les Phoques, les Morses, et les Lamantins.] | [Monogram.] A Paris, | de l'Imprimerie de F. Dufart | — | An X. [=1802]. 8°. ll. 2, pp. 1–316, pll. ccxxxii–ccxxxv.

A reissue of the An VIII edition, with only, so far as relates to the body of the work, a change of date on the title-page, but the "Exposition méthodique" by Latreille (*see* 1800. Latreille) is printed in smaller type and occupies 7 less pages (pp. 251–314), thus giving to the volume a different collation. [463.]

1802. "**Gilibert, J. Emm.** Abrégé du système de la Nature de Linné; histoire des Mammifères ou des Quadrupèdes et Cétacés; contenant 1° la traduction libre du texte de Linné et de Gmelin; 2° l'extrait des observations de Buffon, Brisson, Pallas et autres célèbres zoologistes; 3° l'anatomie comparée des principales espèces; le tout relatif aux Quadrupèdes et aux Cétacés les plus curieux et les plus utiles. Avec portr. et 18 pl. in-8. Lyon, an X (1802), ou 1805, Matheron et Co."

Not seen; title from Carus and Engelmann. [464.]

1802. **Klein, J. T.** "Ichthyologia, seu Historiae piscium naturalis quinque missus. Cui accedit Ichthyologia Kleiniana enodata, sive index rerum ad Historiam piscium naturalem, cum synonymis recentissimorum systematicorum Artedi, Linnaei, Gmelini, Blochii, etc. explicatam. Lipsiæ, in libraria Gleditschiana. 1802. 4°. Met 53 platen."

Not seen; title from Bosgoed, *op. cit.*, p. 10, no. 113. [465.]

1802. **Ozeretskovsky, N.** De speciebus systematicum genus Trichechi constituentibus. <*Nov. Act. Acad. Scien. imp. Petropolitanæ*, xiii, 1802, pp. 371–375.

Chiefly about the relationship of the Walrus, Steller's Sea Cow, and the Dugong. [466.

1803. **Camper, Pierre.** Œuvres | de Pierre Camper, | qui ont pour objet | l'histoire | naturelle, | la physiologie | et l'anatomie comparée. | [Trad. par Henri J. Jansen.] | — | Tome premier [–troisième]. | — | A Paris, | Chez H. J. Jansen, rue des postes, No. 6, | près de l'estrapade. | — | An XI.—1803. 3 vols. 8°. Vol. i, pp. i–civ, 1–392; vol. ii, pp. 1–503; vol. iii, pp. 1–502. Avec une Atlas des planches en-fol.

Conjectures sur les pétrifactions trouvées dans la Montagne de S.-Pierre près de Mæstricht, tom. i, pp. 357–377, pll. vi, vii, (Vertèbres et dents de Cetacées, etc.). Du Dugon du Comte de Buffon, tom. iii, pp. 479–491, pl. vii, figg. 2, 3, animal. [467.]

1803. "**Gruber, J. G.** Beschreibung von Grönland und Spitsbergen mit den Wundern der Natur- und Menschenwelt um den Nordpol. Zurich und Leipzig, 1803. 4°."

Not seen; title from Bosgoed, *op. cit.*, p. 237, no. 3468. [468.]

1803. **Roxburgh, [W.]** An account of a new Species of *Delphinus*, An Inhabitant of the Ganges. <*Asiatic Researches*, vii, 1803, pp. 170–174, pl. iii.

Delphinus gangeticus, sp. n., p. 171. [469.]

1804. **Bory de St. Vincent, J. B. G. M.** Voyage | dans | les quatre principales Iles | des mers d'Afrique, | fait par ordre du Gouvernement, | pendant les années neuf et dix de la | République (1801 et 1802), | Avec l'Histoire de la Traversée du Capitaine Baudin jusqu'au Port- | Louis de l'Ile Maurice. | Par J[ean]. B[aptiste]. G[eorge]. M[arie]. Bory de St-Vincent, | Officier d'Etat-major; Naturaliste en chef sur la | Corvette *le Naturaliste*, dans l'Expédition de | Découvertes commandée par le Capitaine Baudin. | Avec la Collection de 58 Planches, grand in-4°., dessinées sur les lieux par l'Auteur, | et gravées en taille-douce | Tome Premier [Seconde et Troisème]. | — | A Paris, | Chez F. Buisson, Imprimeur-Libraire, rue Hautefeuille, no. 20. | An XIII. (1804.) 8°. Tom. 1re, pp. i–xvi, 1–412; tom. 2e, ll. 2, pp. 1–431; tom. 3e, ll. 2, pp. 1–473.

Cétacés, *passim*: *Delphinus phocœna*, de se chasse aux poissons volans et de se mœurs, etc., tom. i, pp. 88, 89; description de dauphin [= *Delphinus Boryi*, Desm. ?], pp. 104–106; *Balæna physalus*, Linn., pp. 145, 146; "un banc de *dauphins* . . . plusieurs milliers," tom. iii, p. 293; dauphins très-gros, pp. 293, 294.

Contains nothing of importance relating to Cetaceans. [470.]

1804. **Fr—p. [= Froriep, L. F. von].** Tabelle der Unterordnungen, Geschlechten und Gattungen der Wallfische. Von Lacepede. <*Voigt's Mag. der Naturk.*, vii, 1804, pp. 445–450.

"Aus einem so eben erschienenen Werke von Lacepede, und vom Hrn. Prof. Froriep mitgetheilt."—Siehe *op. cit.*, p. 475. [471.]

1804. **Lacépède, [Bern. Germ. Étienne].** Histoire naturelle | des Cétacées, | dediée a Anne-Caroline La Cepède: | par le Citoyen La Cepède | . . . . [= titles, 11 lines.] | — | A Paris, | Chez Plassan, Imprimeur-Libraire, | Rue de Vaugiard, No 1195. | — | L'an XII de la République [1804]. 4°. pp. i–xliv, 1–329, pll. i–xvi. (Pll. vi, vii, xi, xii, xiv, xvi, désignées d'après nature.)

Dédicace, p. v. Table des Articles, pp. vi–viii. Avertissement, et explication de quelques planches, pp. ix, x. Vue général des Cétacées, pp. xi–xxxiii. Tableau des ordres, genres et espèces de Cétacées, pp. xxxv–xliv.

Les Baleines, pp. 1–113. **1.** La Baleine franche (*Balæna mysticetus*), pp. 1–102, pl. i, fig. 1 (d'après Martens). **2.** La Baleine Nordcaper (*Balæna nordcaper*), pp. 103–110, pll. ii, iii, (d'après Bachstrom; fig. = *Balæna mysticetus*). **3.** La Baleine noueuse (*Balæna nodosa*), pp. 111, 112. **4.** La Baleine bossue (*Balæna gibbosa*), p. 113.

Les Baleinoptères, pp. 114–141. **5.** La Baleinoptère gibbar (*Balænoptera gibbar*), pp. 114–119, pl. i, fig. 2 (d'après Martens). **6.** La Baleinoptère jubarte (*Balænoptera jubartes*), pp. 120–125, pl. iv, fig. 1. **7.** La Baleinoptère rorqual (*Balænoptera rorqual*), pp. 126–133, pl. i, fig. 3, animal, pl. v, fig. 1 (" gravé d'après un dessin de Jacques Quine), pl. vi, tête osseuse, pl. viii, vertèbres cervicales et autres vertèbres et fanons (pll. vi–viii d'après nature). **8.** La Baleinoptère museau-pointu (*Balænoptera acuto-rostrata*), pp. 134–141, pl. viii, figg. 1, 2, animal, fig. 3, mâchoire supérieure.

1804. Lacépède, [Bern. Germ. Étienne]—Continued.

Les Narwals, pp. 142–163. **9.** Le Narwal vulgaire (*Narwalus vulgaris*), pp. 142–158, pl. iv, fig. 3. **10.** Le Narwal microcéphale (*Narwalus microcephalus*), pp. 159–162, pl. v, fig. 2, animal, d après un dessin par W. Brand), pl. ix, fig. 1, tête osseuse. **11.** Le Narwal Anderson (*Narwalus Andersonianus*), p. 163.

Les Anarnaks, p. 164. **12.** L'Anarnak groenlandoise (*Anarnak Groenlandicus*), p. 164.

Les Cachalots, pp. 165–218. **13.** Le Cachalot macrocéphale (*Catodon macrocephalus*), pp. 165–211, pl. x, fig. 1, animal (d'après Bonnaterre), pl. xi, tête osseuse, pl. xii, vertèbres et côte (pll. xi, xii d'après nature). **14.** Le Cachalot trumpo (*Catodon trumpo*), pp. 212–215, pl. x, fig. 2 (d'après Robertson). **15.** Le Cachalot svineval (*Catodon svineval*), pp. 216, 217, pl. ix, fig. 2, tête ossense [=*Globiocephalus melas*]. **16.** Le Cachalot blanchatre (*Catodon albicans*) [=*Beluga catodon*], p. 218.

Les Physales, pp. 219–226. **17.** Le Physale cylindrique (*Physalus cylindricus*), pp. 219–226, pl. ix, fig. 3 (d'après Anderson).

Les Physétères, pp. 227–242. **18.** Le Physétère microps (*Physeter microps*), pp. 227–235. **19.** Le Physétère orthodon (*Physeter orthodon*), pp. 236–238. **20.** Le Physétère mular (*Physeter mular*), pp. 239–242.

Les Delphinaptères, pp. 243–249. **21.** Le Delphinaptère béluga (*Delphinapterus beluga*), [=*Beluga catodon*], pp. 243–248. **22.** Le Delphinaptère sénedette (*Delphinapterus senedetta*), p. 249.

Les Dauphins, pp. 250–317. **23.** Le Dauphin vulgaire (*Delphinus vulgaris*), pp. 250–286, pl. xiii, fig. 1, animal, pl. xiv, fig. 1, tête. **24.** Le Dauphin marsouin (*Delphinus phocæna*), pp. 287–297, pl. xiii, fig. 2, pl. xiv, fig. 2, squelette (pl. xiv d'après nature). **25.** Le Dauphin orque (*Delphinus orca*), pp. 298–301, pl. xv, fig. 1, pl. xvi, crâne (d'après nature). **26.** Le Dauphin gladiateur (*Delphinus gladiator*), pp. 302–303, pl. v, fig. 3. **27.** Le Dauphin Nesarnack (*Delphinus nesarnack*), pp. 307, 308, pl. xv, fig. 2. **28.** Le Dauphin diodon (*Delphinus diodon*), pp. 309, 310. **29.** Le Dauphin ventru (*Delphinus ventricosus*), p. 311, pl. xv, fig. 3 (d'après Hunter). **30.** Le Dauphin férès (*Delphinus feres*), pp. 312, 313. **31.** Le Dauphin de Duhamel (*Delphinus Duhameli*), pp. 314, 315. **32.** Le Dauphin de Péron (*Delphinus Peronii*), p. 316. **33.** Le Dauphin de Commerson (*Delphinus Commersoni*), pp. 317, 318.

Les Hypéroodons, pp. 319–324. **34.** L'Hypéroodon butskopf (*Hyperoodon butskopf*), pp. 319–324, pl. xv, fig. 3.

Table alphabétique, pp. 325–329.

The text is an elaborate compilation; the figures of the animals, with the two or three above-noted exceptions, are copies; all the osteological figures, except one, are original. Viewed in the light of to-day, the work is a striking commentary on the poverty of the author's resources, and on the inexact information of the times in all that related to the history of Cetacea. Compared with Bonnaterre's work (1789), the number of species is greatly increased, while the generic nomenclature differs to a very large degree, through the introduction of new genera and the substitution of new names for others. The prominent feature is therefore the classification, which, considering the state of Cetological knowledge at this time, is entitled to praise. Its weakness lies in the recognition of a large number of species now known to be nominal or fictitious, but which, supported by Lacépède's endorsement, figured prominently for many years in the works of later compilers.

Lacépède's new genera are the following: **1.** *Balænoptera*, **2.** *Narwalus* (=*Monodon*), **3.** *Anarnak* (based on *Monodon spurius*, Fabr.), **4.** *Catodon* (ex Artedi?), **5.** *Physalus*, **6.** *Delphinapterus*, and, **7.** *Hyperoodon*. His new specific designations are: **1.** *Balænoptera gibbar* (=*Balæna physalus*, Linn.), **2.** *Balænoptera jubartes* (=*Balæna boops*, Linn.), **3.** *Balænoptera acuto-rostrata* (=*Balæna rostrata*, Müll.), **4.** *Narwalus vulgaris*, **5.** *N. microcephalus*, **6.** *N. Andersonianus* (=*Monodon monoceros*), **7.** *Anarnak groenlandicus* (=*Monodon spurius*, Fabr.), **8.** *Catodon svineval* (=*Globiocephalus melas*), **9.** *Physeter orthodon*, **10.** *Delphinapterus beluga* (=*Beluga catodon*), **11.** *Delphinus vulgaris* (=*D. delphis*), **12.** *Delphinus nesarnack* (=*D. tursio*, Fabr.), **13.** *Delphinus diodon* (=*Hyperodon butzkopf*), **14.** *Delphinus ventricosus* (=? *Grampus griseus*), **15.** *Delphinus Duhameli*, sp. n., **16.** *Delphinus Peronii* (=*D. leucorhamphus*, Péron, Ms.), sp. n., **17.** *Delphinus Commersoni* (ex Commerson, Ms.), sp. n.

Besides the Sonnini version of 1804 (*q. v.*), Lacépède's *Hist. nat. de C´tacés* was republished in 1805, in two vols. 12°, in the 90 vol. 12° ed. of Buffon, forming vols. 89, 90; in Lacépède's 8° ed. of Buffon published in 1819 (not seen by me), and in later editions of the same. Also in the collected works of Lacépède (ed. Desmarest, 11 vols. 8°, 1826–31), and in the later editions of his works published in 1830, 1836, 1839, and 1844 (not seen by me). *Cf.* Carus and Engelmann, *Bibliotheca hist. nat.*, i, 1846, p. 332. [472.]

1804. Sonnini [de Mannoncourt], C. [N.] S. Histoire naturelle, | générale et particulière, | des Cétacées. | Ouvrage fasaint suite à l'Histoire naturelle, générale | et particulière, composée par Leclerc de Buffon, et | mise dans un nouvel ordre par C[harles]. [Nicolas] S[igisbert]. Sonnini [de Mannoncourt],

1804. SONNINI [DE MANNONCOURT], C. [N.] S.—Continued.
avec | des Notes et des Additions. | Par C. S. Sonnini, | Membre des plusieurs Sociétes savantes | et littéraires. | [Monogram.] A Paris, | de l'Imprimerie de F. Dufart. | — | An XII [=1804]. 8°. pp. 1–446, pll. i–v.

Vue générale des Cetacées, pp. 5–30; Tableau des Ordres, Genres et Espèces de Cétacées, pp. 31–42.

Les Baleines, pp. 43–192. **1.** La Baleine franche (*Balæna mysticetus*), pp. 43–179, pl. i. **2.** Le Nordcaper (*Balæna nordcaper*), pp. 180–188. **3.** La Baleine noueuse (*Balæna nodosa*), pp. 189, 190. **4.** La Baleine bossue (*Balæna gibbosa*), pp. 191, 192.

Les Baleinoptères, pp. 193–226. **5.** Le Gibbar (*Balænoptera gibbar*), pp. 193–199, pl. ii, fig. 1. **6.** La Jubarte (*Balænoptera jubartes*), pp. 200–207. **7.** La Baleinoptère rorqual (*Balænoptera rorqual*), pp. 208–217. **8.** Le Museau-pointu (*Balænoptera acuto-rostrata*), pp. 218–226.

Les Narwals, pp. 227–251. **9.** LeNarwal vulgaire (*Narwalus vulgaris*), pp. 227–245, pl. ii, fig. 2. **10.** Le Narwal microcéphale (*Narwalus microcephalus*), pp. 246–251. **11.** Le Narwal Anderson (*Narwalus andersonianus*), p. 251.

Les Anarnaks, pp. 252, 253. **12.** L'Anarnak Groenlands (*Anarnak groenlandicus*), pp. 252, 253.

Les Cachalots, pp. 254–319. **13.** Le Cachalot macrocéphale (*Catodon macrocephalus*), pp. 254–311, pl. iii, fig. 1. **14.** Le Cachalot trumpo (*Catodon trumpo*), pp. 312–316. **15.** Le Cachalot svineval (*Catodon svineval*), pp. 317, 318. **16.** Le Cachalot blanchatre (*Catodon albicans*), p. 319.

Les Physales, pp. 320–328. **17.** Le Physale cylindrique (*Physalus cylindricus*), pp. 320–328, pl. iii, fig. 2.

Les Physétères, pp. 329–346. **18.** Le Physétère microps (*Physeter microps*), pp. 329–338. **19.** Le Physétère orthodon (*Physeter orthodon*), pp. 339–342. **20.** Le Mular (*Physeter mular*), pp. 343–346.

Les Delphinaptères, pp. 347–355. **21.** Le Beluga (*Delphinapterus beluga*), pp. 347–353. **22.** Le Sénedette (*Delphinapterus senedette*), pp. 354, 355.

Les Dauphins, pp. 356–437. **23.** Le Dauphin vulgaire (*Delphinus vulgaris*), pp. 356–399, pl. iv, fig. 1. **24.** Le Marsouin (*Delphinus phocæna*), pp. 400–412, pl. iv, fig. 2. **25.** L'Orque (*Delphinus orca*), pp. 413–417. **26.** Le Dauphin gladiateur (*Delphinus gladiator*), pp. 418–422. **27.** Le Nésarnack (*Delphinus nesarnack*), pp. 423–425, pl. v, fig. 1. **28.** Le Diodon (*Delphinus diodon*), pp. 426, 427, pl. v, fig. 2. **29.** Le Dauphin ventru (*Delphinus ventricosus*), pp. 428, 429. **30.** Le Dauphin férès (*Delphinus feres*), pp. 430–432. **31.** Le Dauphin de Duhamel (*Delphinus Duhameli*), pp. 433, 434. **32.** Le Dauphin de Péron (*Delphinus Peronii*), p. 435. **33.** Le Dauphin de Commerson (*Delphinus Commersonii*), pp. 436–437.

Les Hypéroodons, pp. 438–444. **34.** Le Butskopf (*Hyperoodon butskopf*), pp. 438–444.

Although this work bears the same date (an XII) as Lacépède's *Hist. nat. des Cétacées* (*see* 1804. LACÉPÈDE), it is merely a slightly abridged version of that work, with here and there slight additions. Although the text is mostly inclosed in marks of quotation, I fail to find any acknowledgment of the source. The work is currently attributed, however, to Sonnini. The arrangement of the matter, the number of species treated, their order of succession and nomenclature, are identical in the two works. [473.]

1804. "WIEDEMANN, C. R. W. Beschreibung des Schädels vom Lamantin oder Manati. <*Wiedemann's Arch. für Zool. und Zoot.*, iv, 1804, pp. 67–77."

Not seen; title from Carus and Engelmann. [474.]

1805. CARLISLE, ANTHONY. The Physiology of the Stapes, one of the Bones of the Organ of Hearing; deduced from a comparative View of its Structure, and Uses, in different Animals. <*Philos. Trans. Lond.*, [xcv], pt. 2, art. xi, 1805, pp. 198–210, pl. iv.

The plate gives figures of the stapedes and columellæ of various animals, including *Phoca vitulina*, *Phocæna communis*, and *Odobænus rosmarus*. [475.]

1805. HOLMES, A. American Annals; | or | a Chronological | History of America | from its Discovery in MCCCCXCII to MDCCCVI. | In two Volumes. | By Abiel Holmes, D. D. A. A. S. S. H. S. | Minister of the First Church in Cambridge. | ——— Suum quæque in annum referre. | Tacit. Annal. | — | Vol. I | Comprising a period of Two Hundred Years. | — | Cambridge, Printed and Sold by W. Hilliard. | — | 1805. 2 vols. 8°.

The title of vol. ii differs from the above as follows:

Vol. II. | Comprising a Period of One Hundred and Fourteen Years.

Whale-fishery in 1730, vol. ii, p. 125—a brief statement embraced in 6 lines. Also brief reference to Morse-fishing and Whale-fishing in the Gulf of St. Lawrence in 1593, vol. i, p. 133. [476.]

1805. MACPHERSON, D. Annals | of | Commerce, | Manufactures, Fisheries, and Navigation | with | brief notices of the Arts and Sciences connected with them. | Containing the | Commercial Transactions | of the | British Empire and other Countries, | from the earliest accounts to the meeting of the Union Parliament in January 1801; | and comprehending the most valuable part of the late Mr. Anderson's History of Commerce, viz. from the year 1492 | to the end of the reign of George II, King of Great Britain, &c. | With a large Appendix, | containing | Chronological Tables of the Sovereigns of Europe, | Tables of the alterations of money in England and Scotland, | A Chronological Table of the prices of Corn, &c. and | A Commercial and Manufactural Gazetteer of the | United Kingdom of Great Britain and Ireland | With a general chronological Index. | The Antient Part composed from the most authentic Original Historians and Public Records, | printed and in Manuscript, and the Modern Part from Materials of unquestionable | Authenticity (mostly unpublished) extracted from the Records of Parliament, | the Accounts of the Custom-house, the Mint, the Board of Trade, the | Post-Office, the East-India Company, the Bank of England, | &c. &c. | By David Macpherson. | — | In Four Volumes. | — | Vol. I [-IV]. | — | Printed for Nichols and Son, . . . [=nearly 4 lines of names of booksellers]. | London; | and for Mundell and Son, Edinburgh. | — | 1805. 4 vols. 4°.

The chronological arrangement of the work precludes reference to special topics, since the same subject may be briefly mentioned in many places. A very detailed and thorough index, however, renders the matter readily accessible, and to this index the present writer would refer the investigator of matters relating to the Whalefishery and kindred topics. The work is one of great research and labor, and is standard authority on the subjects treated. [477.]

1806. DUMÉRIL, A. M. C. Zoologie analytique, | ou | Méthode naturelle | de | Classification des Animaux, | rendue plus facile | a l'aide de Tableaux synoptiques; | Par A[ndré]. M[arie]. Constant Duméril, | . . . . [titles, 6 lines of small type]. Parva sed apta. | — | Paris | Allais, Libraire, quai des Augustins, N°. 39. | — | M. DCCC. VI. 8°. pp. i-xxxii, l. 1, pp. 1-344.

XIIIe. Famille, *Amphibies* [=*Pinnipedia*+*Sirenia*]. pp. 26, 27. Genera 3, under French and Latin names, viz: **1.** *Phoca*, **2.** *Trichecus*, **3.** *Dugong*, **4.** *Manatus*.

XIVe. Famille, *Cétacés*, pp. 28, 29. Genera 10, under French and Latin names, viz: **1.** *Balæna*, **2.** *Balenoptera*, **3.** *Narwhalus*, **4.** *Ananarcus*, **5.** *Catodon*, **6.** *Phylasus* (sic), **7.** *Physeterus*, **8.** *Delphinapterus*, **9.** *Delphinus*, **10.** *Hyperodon*. [478.]

1806. TURTON, W. A general | System of Nature, | through the | Three Grand Kingdoms | of | Animals, Vegetables, and Minerals, | systematically divided | into their several | Classes, Orders, Genera, Species, and Varieties, | with their | Habitations, Manners, Economy, Structure, and Peculiarities. | By Sir Charles Linnè: | Translated Gmelin, Fabricius, Willdenow, &c. | Together with | Various Modern Arrangements and Corrections, derived from the | Transactions of the Linnean and other Societies, as well as from the Classical | Works of Shaw, Thornton, Abbot, Donovan, Sowerby, Latham, Dillwyn | Lewin, Martyn, Andrews, Lambert, &c. &c. | with a life of Linnè, | Appropriate Copper-plates, and a Dictionary explanatory of the Terms which | occur in the several Departments of Natural History, | by William Turton, M. D. | Fellow of the Linnean Society, Author of the Medical Glossary, &c. &c. | — | In Seven Volumes. | — | Animal Kingdom.—Vol. I. | Mammalia. Birds. Amphibia. Fishes. | — | London: | Printed for Lackington, Allen, and Co. | Temple of the Muses, Firesbury-Square. | — | 1806. 8°. pp. i-vii, 1-944. ("Printed by Voss and Morris, Castle-Street, Swansea. 1800," p. 943.)

Order vii. *Cete*, pp. 127-130. **1.** *Monodon Monoceros*, **2.** *Balæna Mysticetus*, p. 127; **3.** *B. Physalus*, **4.** *B. Boops*, **5.** *B. Gibbosa*, **6.** *B. Musculus*, **7.** *B. Rostrata*, **8.** *Physeter Catodon*, **9.** *P. Macrocephalus*, p. 128; **10.** *P. Microps*, **11.** *P. Tursio*, **12.** *Delphinus Phocæna*, **13.** *D. delphis*, p. 129; **14.** *D. Orca*, **15.** *D. Leucas*, p. 130. Short, nearly worthless, descriptions, *and no references to previous authors.*

1806. TURTON, W.—Continued.

Sirenia: **1.** *Trichechus Durong* (sic), **2.** *T. Manatus*, with var. 1. *Australis* (= African and American Manatees), var. 2. *Borealis* (= *Rhytina borealis*), var. 3, *Siren* (fabulous), pp. 36, 37. The following complete transcript of the account of the *Trichechus Manatus Sirenus* is a sufficient commentary on the character of the work :

"3. *Siren*. Ears erect, sharp-pointed. Inhabits the north-west coast of *America*, swims around ships with antic gestures. *Head* resembling a dog; *eyes* large; lips whiskered: *body* thick, round, tapering downwards; tail divided into 2 unequal lobes; length about 5 feet." [479.]

1807. HOME, E. Observations on the structure of the different Cavities, which constitute the Stomach of the Whale, compared with those of ruminating Animals, with a View to ascertain the Situation of the digestive Organ. <*Philos. Trans. Lond.*, [xcvii], pt. 1, art. iv, 1807, pp. 97–102, pll. iii, iv.

Investigation based on "a Delphinus Delphis of Linnaeus, or small bottle-nose whale of Mr. Hunter." [480.]

1808. ANON. A Short and true Account of Forty-two Persons [Whalers] who perished by shipwreck near Spitzbergen, in the year 1646. <*Pinkerton's Coll. Voy. and Trav.*, i, 1808, p. 536. [481.]

1808. ANON. Third Voyage of the Dutch and Zealanders, by the North, along Norway, Moscovy, and Tartary, to pass to the kingdoms of Cathay and China, by permission of the Council of the city of Amsterdam, 1593. <*Pinkerton's Coll. Voy. and Trav.*, i, 1808, pp. 90–127.

"Newly translated from the Recueil des Voyages, qui ont servi a l'etablissement et aux progrez de la Compagnie des Indes Orientales. Tom. i, p. 55."

Whales described, pp. 93, 94. Very good description of the Northern Right Whale. [482.]

1808. BACSTROM, S. Account of a [Whaling] Voyage to Spitzbergen in the Year 1780. By S. Bacstrom, M. D. <*Pinkerton's Coll. Voy. and Trav.*, i, 1808, pp. 614–620.

From *Phil. Mag.*, July, 1799. [483.]

1808. BLUMENBACH, J. F. Manuel | d'Histoire naturelle, | traduit de l'Allemand, | De J. Fr. Blumenbach, Professeur à l'Université | de Gottingue. | Par Soulange Artaud. | Avec figures. | — | Multa fiunt eadem, sed aliter, | Quintilian. | — | Tome Premier. | [Monogram.] | A Metz, | Chez Collignon, Imprimeur-Libraire. | . . . [= Names of 3 other publishers.] | — | An XI.—1803. 8°. pp. i–xvi, 1–526.

Trichechus manatus, p. 164, Les Cétacées (*Cetacea*), pp. 165–169. A translation of one of the early editions, but which is not stated. The matter relating to the *Cetacea* is substantially the same as that of the 3d ed., 1788, *q. v.* [484.]

1808. LEEMS, K. An Account of the Laplanders of Finmark, their language, manners, and religion, by Knud Leems, Professor of the Laplandic, with the notes of Gunner, Bishop of Drontheim, and a Treatise, by Jessen, on the Pagan Religion of the Finns and Laplanders. <*Pinkerton's Coll. Voy. and Trav.*, i, 1808, pp. 376–490.

Chap. xiii. Of the Fishery, pp. 431–446. Contains a short account of the Whales and Whalefishery of Finmark, pp. 431–433.

The original edition of Leems (not seen by me) was published in Danish and Latin at Copenhagen in 1767, 4°, with plates. [485.]

1808. PHIPPS, C. J. A voyage towards the North Pole, undertaken by his Majesty's command, in 1773, by Constantine John Phipps. <*Pinkerton's Coll. Voy. and Trav.*, i, 1808, pp. 538–594.

Natural history, pp. 578–585. *Balæna Mysticetus*, *Balæna Physalus*, p. 579 (= 7 lines of no importance). [486.]

1808. TIEDEMANN, D. F. Zoologie. | — | Zu seinen Vorlesungen entworfen | von | D. Friedrich Tiedemann, | Professor der Anatomie und Zoologie an der Universität zu | Landshut. | — | Erster Band. | Allgemeine Zoologie, Mensch und Säugthiere. | — | Landshut, in der Weberschen Buchhandlung. | — | 1808. 8°. pp. i–xvi, 1–610, l. 1.

XII. Ordnung. Fischartige Säugthiere. Wallfische. *Cetacea* (Cetacés), pp. 557–585. Generalities, 557–570; genera and species, pp. 570–585. **1.** *Balaena mysticetus*, **2.** *B. islan-*

1808. Tiedemann, D. F.—Continued.
dica (Nordkaper); **3.** Der Wallfisch mit einem Höcker, *B. nodose*, p. 571; **4.** *B. gibbosa*, **5.** *Balaenoptera gibbar*, **6.** *B. rostrata*, p. 572; **7.** *B. boops*, **8.** *B. rorqual*, p. 573; **9.** *Narwalus vulgaris* (= *Monodon-monoceros*), **10.** *N. microcephalus*, **11.** *N. Andersonianus*, p. 574; **12.** *Anarnacus groenlandicus*, p. 575; **13.** *Catodon macrocephalus*, p. 576; **14.** *C. albicans*, **15.** *C. trumpo*, **16.** *C. svineval*, p. 577; **17.** *Physalus cylindricus*, p. 578; **18.** *Physeter microps*, **19.** *P. orthodon*, **20.** *P. mular*, p. 579; **21.** *Delphinapterus beluga*, **22.** *D. senedetta*, p. 580; **23.** *Delphinus delphis*, **24.** *D. phocaena*, p. 581; **25.** *D. Orca*, **26.** Der Delphin mit der hohen Rückenflosse, p. 582; **27.** *D. tursio*, **28.** *D. diodon*, **29.** *D. Bonnaterrei*, sp. n. (= le dauphin férès, Bonnaterre), p. 583; **30.** *D. ventricosus*, **31.** *D. Duhamelii*, **32.** *D. Peronii*, **23.** *D. Comersonii*, **34.** *Hyperoodon butzkopf*, p. 584.

Delphinus Bonnaterrei, sp. n., p. 583. Genn. 11, spp. 34.

Number of species and nomenclature same as Lacépède's, excepting "*D. Bonnaterrei.*" [487.]

1808. Willoughby, H. The Voyages of Sir Hugh Willoughby, Richard Chancelor, and others, to the Northern parts of Russia and Siberia. <*Pinkerton's Coll. Voy. and Trav.*, i, 1808, pp. 1–80.

From Hackluyt's *Voy. and Trav.* [488.]

1809. Abernethy, J. Some Particulars in the Anatomy of a Whale. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, xvii (1791–1796), 1809, pp. 673–677.

From *Philos. Trans. Lond.*, lxxxvi, 1796, pp. 27 *et seqq.*, *q. v.* [489.]

1809. Anon. Of the New American Whale-Fishing about Bermudas. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, i (1665–1672), 1809, pp. 6, 7.

From *Philos. Trans. Lond.*, i, no. 1, 1665, p. 11, *q. v.* [490.]

1809. Anon. A further Relation of the Whale-Fishing about the Bermudas, and on the Coast of New-England and New-Netherland. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, i (1665–1672), 1809, p. 46. [With supplementary note.]

From *Philos. Trans. Lond.*, i, no. 8, 1663, p. 132, *q. v.* [491.]

1809. Anon. Description de la Piece d'Ambregris que la Chambre d'Amsterdam a reçue des Indes Orientales, pesant 182 Livres; avec un petit Traité de son Origine et de sa Vertu, par Nicolas Chevalier, a Amsterdam chez l'Auteur, 1700. 4°. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, iv (1694–1702), 1809, p. 500.

From *Philos. Trans. Lond.*, xxii, no. 263, 1700, p. 573, *q. v.* *See* 1700. Chevalier, N. [492.]

1809. Boyle, [R.] On Ambergris. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, ii (1672–1683), 1809, pp. 94, 95. [With suppl. foot-note.]

From *Philos. Trans.*, *Lond.*, vii, no. 97, 1673, pp. 6113–6115, *q. v.* [493.]

1809. Boylston, —. Ambergris found in Whales. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, vii (1724–1734), 1809, p. 57.

From *Philos. Trans. Lond.*, xxxiii, no. 385, 1724, p. 193, *q. v.* [494.]

1809. "**Cortesi.** Sugli Scheletri d'un Rhinoceronte afric. et d'una Balena. Milan, 1809."

Not seen; title from Van Beneden, *Oss. foss. des environs d'Anvers*, ii, 1880, p. 17. [495.]

1809. Cuvier, G. Sur l'ostéologie du Lamantin, sur la place que le Lamantin et le Dugong doivent occuper dans la méthode naturelle, et sur les os fossiles de Lamantins et de Phoques. <*Ann. du Mus. d'Hist. Nat.*, xiii, 1808, pp. 273–312, pl. xix.

Historique, pp. 273–282; Art. I. Du lamantin d'Amerique, pp. 282–293; Art. II. Des espèces nominales du petit lamantin des Antilles et du lamantin des Grandes Indes. pp. 293, 294; Art. III. Du lamantin du Sénégal, pp. 294–296; Art. IV. Du prétendu lamantin du Nord, de Steller, pp. 296–299; Art. V. Du dugong, pp. 300–302; Art. VI. Ossemens fossiles de lamantins, pp. 303–309; Art. VII. De quelques os de phoques trouvés avec ceux de lamantins, dans le département de Maine-et-Loire, et des prétendus os de morse annoncés par quelques naturalistes, pp. 309–312. Pl. xix, Ostéologie des lamantins et du dugong.

This celebrated memoir marks an epoch in the literary history of the Sirenia. After giving a detailed history of the views respecting the affinities of these animals entertained by pre-

1809. **Cuvier, G.**—Continued.

vious writers, including the absurdities of mermaids and mermen, the author closes his historical résumé by stating that the *Sirenia* form three distinct genera, the Lamantins (of which he recognizes two species), the Dugong, and Steller's Sea-Cow, and that these three genera constitute a separate family, very different from the Seals, with which they had been previously placed, and a little nearer to the *Cetacea* than the Pachyderms are to the Carnivores. Buffon's four species of Lamantin he reduces to two. Then follows an account, with figures, of the osteology of the Brazilian Manatee; a comparison of the skulls of the African and American Manatees, and a résumé of the distinctive structural features of Steller's Sea-Cow, whereby it is generically separated from the Dugong and Manatees. Cuvier's results agree closely with the modern interpretation of the affinities and generic relations of these animals. It was left, however, for Desmarest to bestow technical names upon the species here first clearly distinguished, Cuvier throughout his memoir employing only the French vernacular names. [496.]

1809. **Cuvier, G.** Sur les Lamantins et les Os fossiles de ces animaux. <*Nouv. Bull. des Sci. par la Soc. Philom.*, no. 24, Sept. 1809, pp. 395, 396.

Extrait d' *Ann. du Mus. d'Hist. Nat.*, xiii, pp. 273–312. See last title. [497.]

1809. **Dudley, P.** An Essay on the Natural History of Whales; with a particular Account of the Ambergris found in the Sperma Ceti Whale. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, vii (1724–1734), 1809, pp. 78–84.

From *Philos. Trans. Lond.*, xxxiii, no. 387, 1725, pp. 256–269, *q. v.* [498.]

1809. **Editor.** The Editor's Account, with Observations, of Experiments on Ambergris, made by Mr. John Browne, F. R. S., and by Mr. Ambrose Godfrey Hanckewitz, F. R. S. To which are subjoined Dr. Neuman's Vindicatory Remarks. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, vii (1724–1734), 1809, pp. 668, 669.

From *Philos. Trans. Lond.*, xxxviii, no. 435, 1735, p. 437. *See* 1735. **Neumann, C.** [499.]

1809. **Edmondston, A.** A | View | of the | Ancient and Present State | of the | Zetland Islands; | including their | Civil, Political, and Natural History; | Antiquities; | and | An Account of their Agriculture, Fisheries, Commerce, | and the state of Society and Manners. | By | Arthur Edmondston, M. D. | — | In two volumes. | — | Vol. I [-II]. | — | Edinburgh: | Printed by James Ballantyne and Co. | For Longman, Hurst, Rees, and Orme, London; and | John Ballantyne and Co. Edinburgh. | — | 1809. 2 vols. 8°. Vol. i, pp. i–xiv, 1–364, with map; vol. ii, pp. i–vii, 1–345.

The Zetlands not so favorable a point from which to carry on the Whale Fishery as supposed, vol. i, pp. 290–293. Of Whales and Wrecks. Section I, Of the Division of Whales, vol. ii, pp. 154–174. Fishes [= *Pisces* + *Cetacea*], vol. ii, pp. 296–310. **1.** *Balæna Mysticetus*, **2.** *Balæna Boops*, **3.** *Balæna Musculus*, **4.** *Physeter Catodon*, **5.** *Physeter Microps*, **6.** *Physeter Tursio*, p. 398; **7.** *Delphinus Phocæna*, p. 399; **8.** *Delphinus Orca*; **9.** *Balæna rostrata*, Pontoppidan [= "*Delphinus melas*, Traill"], p. 300; **10.** *Monodon Monoceros*, pp. 301, 302. A *Monodon monoceros* "run on shore in Weesdale-voe in Zetland in September, 1808." Vast multitudes of Ca'ing Whales are noted as appearing regularly on the coast. The other notes relating to *Cetacea* are of little importance. [500.]

1809. **Fawkener, W.** On the Production of Ambergris. A Communication from the Committee of Council appointed for the Consideration of all Matters relating to Trade and Foreign Plantations; with a prefatory Letter from William Fawkener, Esq., to Sir Joseph Banks, Bart., P. R. S. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, xvii (1791–1796), 1809, pp. 6–8.

From *Philos. Trans. Lond.*, lxxxi, 1791, pp. 43–47, *q. v.* [501.]

1809. **Hampe, J. H.** A Description of the same Narhwal [as mentioned in Dr. Steigertahl's communication]. . . . . <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, viii (1735–1743), 1809, p. 161.

From *Philos. Trans. Lond.*, xl, no. 447, 1738, pp. 149, 150, *q. v.* [502.]

1809. Hunter, J. Observations on the Structure and Economy of Whales. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, xvi (1785–1790), 1809, pp. 306–351, pl. 5.

From *Philos. Trans. Lond.*, lxxvii, pt. 2, art. xxxviii, 1787, pp. 371–450, pll. xvi–xxiii, *q. v.* [503.]

1809. Leuwenhoeck, [A. van]. Concerning the Flesh of Whales, and the Crystalline humour of their Eye. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, v (1703–1712), 1809, pp. 155–157.

From *Philos. Trans. Lond.*, xxiv, no. 293, 1704, pp. 1723–1730, *q. v.* [504.]

1809. Neuman, C. On Ambergris. . . . . <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, vii, (1724–1734), 1809, pp. 661–663.

From *Philos. Trans. Lond.*, no. 433, 1734, p. 344, etc., *q. v.* [505.]

1809. Ray, J. Account of the Dissection of a Porpoise. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1635–1800, i (1665–1675), 1809, pp. 639–643. [With supplementary note.]

From *Philos. Trans. Lond.*, vi, no. 76, 1671, p. 2274, etc., *q. v.* [506.]

1809. Robertson, J. Description of the Blunt-headed Cachalot. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, xiii (1770–1776), 1809, pp. 57–59, pl. 1, fig. 6.

From *Philos. Trans. Lond.*, lx, 1771, art. xxvii, pp. 321–324, *q. v.* [507.]

1809. Schwediawer, [F. X.] An Account of Ambergris. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1655–1800, xv (1781–1785), 1809, pp. 389–396.

From *Philos. Trans. Lond.*, lxxiii, art. xv, 1783, pp. 226–241, *q. v.* [508.]

1809. Sibbald, R. Description of the Pediculus Ceti, &c. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, v (1703–1712), 1809, pp. 317, 318.

From *Philos. Trans. Lond.*, xxv, no. 308, 1707, pp. 2314–2317, *q. v.* [509.]

1809. Stafford, R. Of the Tides at Bermudas, also Whales, Spermaceti. . . . . <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, i (1665–1672), 1809, pp. 283, 284.

From *Philos. Trans. Lond.*, iii, no. 40, 1668, pp. 792–795, *q. v.* [510.]

1809. Steigertahl, *Dr.* Of a Narhwal or Unicorn Fish [*Monodon monoceros*], taken in the River Ost, in the Duchy of Bremen. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, viii (1735–1743), 1809, pp. 160, 161, pl. 6, fig. 1.

From *Philos. Trans. Lond.*, xl, no. 447, 1738, pp. 147–149, *q. v.* [511.]

1809. Traill, Thomas Stewart. Description of a new Species of Whale, *Delphinus melas*. <*Nicholson's Journ. Nat. Phil., Chem., and Arts*, xxii, Feb., 1809, pp. 81–83, pl. iii.

Ninety-two Whales of this species were driven ashore in Scapay Bay, in Pomona, one of the Orkneys, in December, 1806, at which time the drawing was taken by James Watson, esq. Account of the external characters and habits of the now well-known "Blackfish." [512.]

1809. Tyson, E. Phocæna; or, The Anatomy of a Porpus, dissected at Gresham College; with a preliminary Discourse concerning Anatomy, and a Natural History of Animals. <*Philos. Trans.*, abridged by Hutton, Shaw and Pearson, 1665–1800, ii (1672–1683), 1809, pp. 500, 501.

From *Philos. Collections*, no. 2, p. 37. *See* 1681. Tyson, E. [513.]

1810. Albers, J. A. Undersögelse over Eenhiörningens (*Monodon Narwal*) Hierte. <*Kongel. Danske Videnskab.-Sels. Skrivter* for aar 1808, 3° Rek., v, 1810, pp. 179–183. [514.]

1810. Ledru, A.-P., *et* [C. N. S.] Sonnini. Voyage | aux Iles | de Ténériffe, | la Trinité, Saint-Thomas, | Sainte-Croix et Porto-Ricco, | exécuté par ordre du Gouvernement Français, | Depuis le 30 Septembre 1796 jusqu'au 7 Juin 1798, sous la | Direction du Capitaine Baudin, pour faire des Recherches | et des Collections relatives à l'Histoire Naturelle; | Contenant | Des Observations sur le Climat, le Sol, la Population, | l'Agriculture, les Productions de ces Iles, le Caractère, les | Mœurs et le Commerce de leurs Habitants, | Par André-Pierre Ledru, |

1810. Ledru, A.-P., *et* [C. N. S.] Sonnini—Continued.
L'un des Naturalistes de l'Expedition, Membre de la Société des Arts | du Mans, de l'Académie Celtique de Paris, du Musée de Tours, | Ex-Professeur de Législation près l'Ecole Centrale de la Sarthe. | Ouvrage accompagné de Notes et d'Additions, | Par M. [C. S.] Sonnini. | Avec une très-belle Carte gravée par J. B. Tardieu, d'après Lopez. | Tome Premier [et Second]. | A Paris, | Chez Arthus Bertrand, Libraire, rue Hautefeuille, nº. 23. | — | 1810. 2 vols., 8º. Vol. i, l, 1. pp. i–xlvij, 1–315, l. 1; vol. ii, l. 1, pp. 1–324, l. 1. Map.

Dauphin (*Delphinus delphis* Linn.), p. 2 (par Ledru), pp. 24–27 (par Sonnini). Marsouin (*Delphinus phocæna* L.), p. 214 (par Ledru), pp. 221–224 (par Sonnini). Combat entre une Baleine (Le Gibbar, *Balæna physalus* L.) et Scie (*Squalus pristis* L.), pp. 217, 218 (par Ledru). Le Gibbar, pp. 220, 221 (par Sonnini). Le Lamantin (*Manatus australis* Gm.), p. 258 (par Ledru), pp. 294, 295 (par Sonnini). [515.]

1810. Péron, [François], *et* [Charles Alexander] Le Lesuer. Notice sur l'habitation des Animaux Marins. <*Ann. du Mus. d'Hist. nat.*, xv, 1810, pp. 287–292.

Balæna mysticetus, p. 288. [516.]

1810. Viborg, E. [Supplementary note to J. A. Alber's "Undersögelse over Eenhiörningens (*Monodon Narwal*) Hierte."] <*Kongel. Danske Videnskab.-Selsk. Skrivter*, for aar 1808, v, 1810, pp. 183, 184. [517.]

1811. Anon. A Description of the Feroe Islands, containing an Account of their Situation, Climate, and Productions; together with the Manners and Customs of the Inhabitants, their Trade, &c. By the Rev. G. Landt. <*Quar. Rev.*, iv, 1811, pp. 333–342.

Contains a few lines (pp. 338, 339) respecting the dread of the Feroese fishermen of Whales, and their method of driving them away by the use of unpleasant oders, as castoreum and oil of juniper! [518.]

1811. Anon. ? [Renaudot, *Abbé*, translator.] An Account of the Travels of two Mohammedans through India and China in the Ninth Century. Translated from the Arabic by the Abbé Renaudot. <*Pinkerton's Coll. Voy. and Trav.*, vii, 1811, pp. 179–230.

Of Ambergris, pp. 222, 223. Ambergris is cast upon the coast of the Indian Ocean, and is also found floating on the surface of the sea. "When a certain fish of the Whale kind, called Tol, sees these floating lumps, he swallows the same, and is killed thereby." Then men seize the dead whale and tow it ashore and take out the Ambergris. [519.]

1811. Fleming, John. Description of a Small-headed Narwal, cast ashore in Zetland. <*Mem. Wern. Soc. Nat. Hist.*, i, 1811, pp. 131–148, 1 pl.

A short diagnosis, with synonymy of *Monodon vulgaris* and *M. microcephalus*. The plate gives two figures of *M. microcephalus*. [520.]

1811. G. Recherches d'anatomie comparée sur les dents, par l. C. Cuvier. <*Bull. de la Soc. Philom. de Paris*, iii, 1811, No. 62, pp. 165*–169* (*i. e.*, 265–269).

Dans le dugong et le narval, p. 165. [521.]

1811. Herausgeber. E. Home über einige Eigenthümlichkeiten des Gehörorgans des Wallfisches (*Balaena mysticetus*). (Aus den *Philosoph. Tr.*, 1811, p. i.) <*Deutsches Archiv f. d. Physiol.*, iii, 1817, pp. 137–139.

Auszug. [522.]

1811. Illiger, C. Caroli Illigeri D. | Acad. Reg. Scient. Berolinens. et Bavaricae sod. | Museo Zoologico Berolin. Praefecti, | Professoris extraod. | Prodromus | Systematis | Mammalium et Avium | additis | Terminis zoographicus utriusque Classis, | eorumque | versione Germanica. | — | . . . . [=Motto, 3 lines.] | — | Berolini | Sumptibus C. Salfeld | 1811. 8º. pp. i–xviii, 1–302.

Sirenia, pp. 140, 141. Genera, **1.** *Manatus*, **2.** *Halicore*, **3.** *Rytina*. **2** et **3** genn. nn.

Cete, pp. 141–144. **1.** *Balaena* [Linn. et auct. var.]; **2.** *Ceratodon* (ex Briss.=*Monodon*, Linn., *Diodon*, Storr, *Narwalus*, Lacép.); **3.** *Ancyclodon* [gen. n.=*Anarnacus*, Lacép.]; **4.** *Physeter* [Linn. et auct. var.]; **5.** *Delphinus* [Linn. et auct. var.]; **6.** *Uranodon* [gen. n.=*Hyperoodon*, Lacép.]. Cum charac. gener. [523.]

1811. Kæmpfer, E. The History of Japan. By Engelbert Kempfer, M. D. Physician to the Dutch Embassy to the Emperor's Court; and translated from his orig-

1811. KÆMPFER, E.—Continued.
inal Manuscript, in the German Language, never before printed. By J. G. Schenchzer, F. R. S. And a Member of the College of Physicians, London. <*Pinkerton's Coll. Voy. and Trav.*, vii, 1811, pp. 652–821.

Chap. VIII. Of Fish and Shells, pp. 705–712. At pp. 706, 707 is a short account of "several sorts of whales," to wit: **1.** *Sebio*, "the largest fish of the Whale kind,—probably *Balæna mysticetus*, **2.** *Awo sangi* or *kokadsura*, a small gray or ash-colored whale, probably *Rhachianectes glaucus*, **3.** *Nagass*, "twenty to thirty fathoms long," **4.** *Sotoo-kadsura*, **5.** *Moko*, "three or four fathoms in length," **6.** *Iwasikura*, "that is, sardin's-eater,"—doubtless a *Balænoptera*. The *Satsifiko*, also mentioned, may be an *Orca*, but as described is certainly a myth.

The original work, of which merely an extended abstract is here given, was published in 1727 (London, fol.). The Appendix, containing the observations on Ambergris, is omitted. For notice of the original work, see Addenda, 1727. KÆMPFER. [524.]

1811. MARSDEN, W. The | History of Sumatra, | containing an account of | the Government, Laws, Customs, and Manners | of | the Native Inhabitants, | with | a description of the Natural Productions, | and a relation of the | Ancient Political State of that Island. | — | By | William Marsden, F. R. S. | — | The third edition, with corrections, additions, and plates. | — | London: | Printed for the Author, | by J. M'Creery, Black-Horse-Court, | And sold by | Longman, Hurst, Rees, Orme, and Brown, Paternoster-Row. | — | 1811. 4°. pp. i–viii, 1–479, ll. 4.

Dūyōng or Sea Cow, p. 122. Grampus Whale (*Delphinus* sp.), p. 122. [525.]

1811. NEILL, PATRICK. Some account of a Fin-Whale stranded near Alloa. <*Mem. Wern. Soc. Nat. Hist.*, i, 1811, pp. 201–214.

Identified as *Balænoptera acuto-rostrata.* [526.]

1811. PARKINSON, J. Organic Remains of a Former World. | — | An | Examination of the Mineralized Remains | of the | Vegetables and Animals | of the | Antedeluvian World; | generally termed | Extraneous Fossils. | — | By James Parkinson. | In three volumes. | [Vignette.]. The third Volume; | containing | the Fossil Starfish, Echini, Shells, Insects, Amphibia, Mammalia, &c. | — | London: | Printed by Whittingham and Rowland, | Goswell Street; | and published by Sherwood, Neely, and Jones, Paternoster-Row; | . . . . [=3 lines, names of other publishers.] | — | 1811. 4°. pp. i–xvi, 1–479, pll. i–xxii.

Vol. i, The Vegetable Kingdom, 1820; vol. ii, The Fossil Zoophytes, 1808.

"*Cete*, or *Ceti*," and "Amphibia" [=*Pinnipedia*+*Sirenia*], vol. iii, pp. 309, 310, pl. xx, fig. 1 (supposed Cetacean tooth). [527.]

1811. SCORESBY, W., *jr*. Account of the Balæna mysticetus, or Great Northern or Greenland Whale. <*Mem. Wern. Soc. Nat. Hist.*, i, 1811, pp. 578–586, 1 pl.

Description, measurements, and habits. [528.]

1811. ZIMMERMANN, E. A. W. Die | Erde und ihre Bewohner | nach | den neuesten Entdekkungen | — | Ein Lesebuch für Geographie, Völkerkunde | Produktenlehre und den Handel | von | E[berhard]. A[ugust]. W[ilhelm]. Zimmermann. | — | Dritter Theil. | Die westliche arctische Welt. | — | Mit einem Titelkupfer und einer Karte. | — | Leipzig bei Gerhard Fleischer dem Júngern. | 1811. 8°. pp. i–viii, 1–327.

Die grossen Fischereien der arctischen Erde.—1) Der Wallfischfang, pp. 239–261. **1.** Der gemeine Wallfisch (*Balaena Mysticetus*), p. 241–245. **2.** Der Finnfisch (*Balaena Physalus* L.), p. 245. **3.** Der Nordkaper, Das Breitmaul (*Balaena Musculus*), pp. 245, 246; [**4.**] Der Cachelot oder Pottfisch (*Physeter macrocephalus*), pp. 246, 247. [**5.**] Der Narwal (*Monodon Monoceros*), p. 248. [Wallfischfang], pp. 249–261. (The Seal-fishery is treated, pp. 261–266.) [529.]

1812. C., F. [=CUVIER, FRÉDÉRIC]. Description des Cétacés échonés dans la baye de Paimpol; par M. G. Cuvier. <*Nouv. Bull. de la Soc. Philom. de Paris*, iii, 5ᵉ année, no. 56, mai 1812, pp. 69–91.

Extrait. [530.]

1812. C., F. [= CUVIER, FRÉDÉRIC]. Notice sur une espèce de Dauphin observée dans la mer glaciale; par M. Fréminville, lieutenant de vaisseau. <*Nouv. Bull. de Sci. par la Soc. Philom. de Paris*, iii, 5e année, no. 56, mai 1812, p. 71.

Extrait. [531.]

1812. CUVIER, [G.]. Rapport fait à la classe des Sciences mathématiques et physiques, sur divers Cétacés pris sur les côtes de France, principalement sur ceux qui sont échoués près de Paimpol, le 7 janvier 1812. <*Ann. du Mus. d'Hist. nat.*, xix, 1812, pp. 1-16, pl. i.

Remarques générals sur les espèces de la famille des Dauphins, qui sont divisé de la manière suivante: I°. Les *Delphinaptères* (Lacép.); II°. Les *Marsouins;* III°. Les Dauphins proprement dits; IV°. Les *Hyperoodons.*

Delphinus griseus, *Delphinus globiceps*, *Delphinus dubius*, spp. nn., p. 14.

Pl. i, *Delphinus griseus*, *D. globiceps* (2 figg.), *D. Aries?* [532.]

1812. HOME, EVERARD. An Account of some Peculiarities in the Structure of the Organ of Hearing in the Balæna Mysticetus of *Linnæus*. <*Philos. Trans. Lond.*, [cii], pt. 1, art. iii, 1812, pp. 83-89, pll. i, ii.

Description of the membrana tympani, with figures of the external and internal parts of the organ of hearing. [533.]

1812. LA HONTAN, *Baron de*. Travels in America, etc. <*Pinkerton's Coll. Voy. and Trav.*, xiii, 1812, pp. 254-273.

Reprinted from the second English ed., London, 1735, 2 vols., 8°.

The Cetacean matter is at pp. 356, 357. *See* 1703. LA HONTAN. [534.]

1813. HOME, EVERARD. On the Tusks of the Narwhale. <*Philos. Trans. Lond.*, [ciii], pt. 1, art. xviii, 1813, pp. 126-130, pl. vii.

Figures are given of the young skull of a male Narwhal, a female skull, milk tusks, lower jaw, and section of a full-grown tusk. [535.]

1813. SCORESBY, WILLIAM, *jr.* Account of the Balæna Mysticetus, or Great Northern or Greenland Whale. (Illustrated by an Engraving.) <*Annals of Philos.*, i, 1813, pp. 51-55, pl. 1.

Reprinted from the *Mem. Wern. Soc.*, vol. i, p. 578 *et seqq.*, *q. v.* [536.]

1814. BLUMENBACH, J. F. Handbuch | der | Naturgeschichte | von | Joh. Fried. Blumenbach. | — | Multa fiunt eadem sed aliter. | Quintilian. | — | Neunte Ausgabe. | — | Göttingen, 1814. | Bei Heinrich Dieterich. 8°. pp. i-xiv, 1-754, ll. 20, pll. i, ii.

IX. *Cetacea*, pp. 134-137. 4 genera, 6 species. The eighth order, *Palmata*, includes *Trichechus*, of which the Manatees form the second "species" (*Trichechus Manatus*, p. 134), the habitat being given as the rivers and sea coasts of the warmer parts of the earth. [537.]

1814. LEWIS, M., *and* W. CLARKE. History | of | The Expedition | under the command of | Captains Lewis and Clark, | to | the sources of the Missouri, | thence | across the Rocky Mountains | and down the | River Columbia to the Pacific Ocean. | Performed during the years 1804-5-6. | By order of the | Government of the United States. | Prepared for the press | by Paul Allen, Esquire. | In two Volumes. | Vol. I [II]. | Philadelphia: | Published by Bradford and Inskeep; and | Abm. H. Inskeep, Newyork. | J. Maxwell, Printer. | 1814. 2 vols. 8°. Vol. i, pp. i-xxviii, 1-470, maps; vol. ii, pp. i-ix, 1-522, maps.

"This is the *editio princeps* of the authentic narrative." Coues (*Bull. U. S. Geol. and Geog. Surv. Terr.*, 2d ser., no. 6, Feb. 8, 1876, pp. 417-444) gives a detailed account of the different editions and versions of this important work, with a commentary on its zoölogical matter.

At pp. 105-111 are passing references to a stranded Whale met with near the mouth of the Columbia River, the skeleton of which (p. 111) was found to measure 105 feet in length. At p. 196, same volume, is a short account of "the whale" and "the porpoise." I omit reference to the numerous subsequent editions. [538.]

1814. RAFINESQUE, C. S. Précis | des découvertes et travaux | somiologiques | de Mr. C. S. Rafinesque Schmaltz. | entre 1800 et 1814 | Ou choix raisonné de ses principales Découvertes | en Zoologie et en Botanique, pour servir | d'introduction à ses ouvrages | futurs | — | De Linné le génie il a choisi pour

1814. Rafinesque, C. S.—Continued.
guide. | — | Palerme | Royale Typographie militaire. | 1814. | Aux dépens de l'Auteur. 16° (4° by sig.). pp. 1–56.

"III. G. Epiodon (Cétacé). Plusieurs dents à la machoire supérieure, aucune à l'inférieure; aucune nageoire dorsale, évents réunis sur la tête.

"5. *Epiodon urganantus.* Corps oblong, attenué postérieurement: museau arrondi, machoire supérieure un peu plus longue, dents égales obtuses.—Obs. Ce Cétacé fut pris vers 1790 sur les côtes de la Sicile, j'en ai eu le dessin. Dans ma Mastologie Sicilienne je fixerai et décrirai plusieurs autres Cétacés des mers de la Sicile, figurés par Mongitore, je les ai nommé *Delphinus dalippus*, *Physeter urganantus*, *Oxypterus mongitori* N. G. à deux nagcoires dorsales, &c." p. 13.

The above is a full transcript of that portion of this rare work relating to Cetaceans. [539.]

1815. Anon. Notes on Nantucket, August 1st, 1807. <*Coll. Mass. Hist. Soc.*, 2d ser., iii, 1815, pp. 19–38.

Hunting of Seals, Whale Fishery, pp. 29, 30. Number of vessels employed in Sealing and Whaling, and where cruising. [540.]

1815. Anon. Size of the Whale. <*Ann. of Philos.*, vi, 1815, pp. 74, 75.

A propos of a statement by W. Scoresby (*op. cit.*, i, 1813, 51–55) on the size of the Whale is here cited Capt. Clarke's measurement of a Whale's skeleton near the Columbia River, "105 feet in length." (*See* 1814. Lewis, M., *and* W. Clarke.) [541.]

1815. Blainville, H. de. Note sur l'existence des nerfs olfactifs dans le dauphin, et, par analogie, dans les autres cétacés. <*Bull. des Sci., par la Soc. Philom.*, 1815, pp. 193–195. [542.]

1815. Hubbard, William. The General History of New England, from the first discovery thereof, till the year 1680. <*Coll. Mass. Hist. Soc.*, 2d ser., vols. v, vi, 1815, pp. 1–676.

Whales killed on the south side of Long Island, near Southhold, vi, pp. 668, 669, 673. [543.]

1815. Illiger, [C.]. Ueberblick der Säugthiere nach ihrer Vertheilung über die Welttheile. <*Abhandl. d. Kön. Akad. d. Wissens. in Berlin*, 1804–1811 (1815), pp. 39–159.

Cete und *Sirenia* passim. Die Ordnung *Natantia* enthält 2 Familien (*Sirenia* und *Cete*), 9 Gattungen und 47 Arten (p. 52). *Sirenia*, 7 Arten; *Cete*, 40 Arten (p. 53).

Of the "40" spp. of *Cete* enumerated in his several tables of distribution a considerable proportion are nominal, they including such names as *Monodon microcephalus* and *M. andersonianus*, *Ancylodon anarnak*, *Physeter orthodon*, *cylindricus*, *trumpo*, etc., *Delphinus senedetta*, *ventricosus*, *feres*, etc.; in addition to a *Delphinus bidens* we have *Hyperodon retusus*. There is also a "*Manatus? Simia*," a *Manatus fluvialis*, and *M. Sphaerurus*, in addition to *M. australis*. There is also a *Rytina cetacea* as well as a *Rytina borealis*. The lists are, so far at least as the *Cete* and *Sirenia* are concerned, worthless conglomerations, which, as in the case of other groups treated in the same connection, appear to contain some names coined for the occasion, without descriptions or textual references. The paper may be safely ignored so far as Cetology is concerned. [544.]

1815. Scoresby, William, *jr.* Description of the Woaps: and Observations on the Size of the Whale. <*Annals of Philos.*, vi, 1815, pp. 313, 314.

In reply to previous remarks in the *Annals* (*l. c.*, p. 74) on the size of the Whale. [545.]

1815–18. "Laing, John. Voyage to Spitsbergen; containing a full description of that country, of the zoology of the North, and of the Shetland isles, with an account of the Whale-fishery. London, 1815–1818. 8°."

Not seen; from Bosgoed, *op. cit.*, p. 240, no. 3497. [546.]

1816. Blainville, H. de. Prodrome d'une nouvelle distribution systematique du règne animal. <*Bull. de la Soc. Philom. de Paris*, 1816, pp. 105–124.

Mammifères, p. 109. Sous-Classe I^re^. Monodelphes, III^e^ degré ou Ordre, les Edentés? { Normaux .... *Édentés*
{ Anormaux, pour nager.. *Cétacés?* [547.]

1816. G[eradin], S. Baleine. <*Dict. des Sci. Nat.*, iii, 1816, pp. 417–468.

[Considérations générales], pp. 417–432. **1.** La Baleine franche (*Balæna mysticetus*, Linn.), pp. 433–438. **2.** La Baleine nord-caper (*Balæna mysticetus*, Linn., var. B. édit. de Gmelin), pp. 438, 439. **3.** La Baleine noueuse (*Balæna nodosa*, Lacép.), pp. 439, 440. **4.** La Baleine bossue (*Balæna gibbosa*, Lacép.), p. 440. **5.** La Baleinoptère gibbar (*Balænoptera gibbar*,

1816. G[ERADIN], S.—Continued.

Lacép.), pp. 441, 442. **6.** La Baleinoptère jubarte (*Balænoptera jubartes*, Lacép.), pp. 442–444. **7.** La Baleinoptère rorqual (*Balænoptera rorqual*, Lacép.), pp. 444, 445. **8.** La Baleinoptère museau-pointu (*Balænoptera acuto-rostrata*, Lacép.), pp. 446, 447. [Sur les organs du sens, des mœurs et de Pêche des Baleines, etc.], pp. 447–468.

We find here again the curious myth about the Indians of Florida capturing Whales by getting astride them and plugging their blowholes with conical pieces of wood, etc., here borrowed from Duhamel. *See* 1590. ACOSTA, J. DE, *and* 1602. DE BRY. [548.]

1816. PITKIN, T. A | Statistical View | of the | Commerce | of the | United States of America: | its connection with | Agriculture and Manufactories: | And an Account of the | Public Debt, Revenues, and Expenditures | of the | United States. | With a brief Review of the Trade, Agriculture, and | Manufactories of the Colonies, previous to | their Independence. | Accompanied with Table illustrative of the | Principles and Objects of the Work. | — | By Timothy Pitkin, | a Member of the House of Representatives of the United States, | from the State of Connecticut. | — | Hartford: | Printed by Charles Hosmer. | — | 1816. 8°. pp. i–xii, 1–407, i–xx.

The Whale Fishery, pp. 42–47. Table no. viii. State of the Whale Fishery in Massachusetts, from 1771 to 1775, inclusive, p. 78. Table no. ix. State of the Whale Fishery, from 1787 to 1789, both inclusive, p. 79. Table no. x. Whale Oil—gallons, p. 80. Table no. x—continued. Spermaceti Oil—gallons, p. 81.

A succinct history of the American Whalefishery, with statistics tables of its products. [549.]

1816–17. VIREY, —, *et* [A. G.] DESMAREST. [Des Baleines, des Baleinoptères, des Cachalots et des Dauphins.] <*Nouv. Dict. d'Hist. Nat.*, iii, 1816, pp. 164–201; iv, 1816, pp. 525–534; ix, 1817, pp. 146–180.

This is a joint production by Virey and Desmarest, written mainly, however, by Virey, under the words "Baleine," "Baleinoptera," and under the same words with various specific modifications, signed respectively "Virey" and "Desm." In the list of authors facing the title-page of the several volumes of the *Nouv. Dict.*, etc., the articles on "Les Quadrupèdes, les Cétacés et les Animaux fossiles," are said to be written by Desmarest, and Virey is stated to have written "Les articles généraux de l'Hist. nat., particulièrement de l'Homme, des Animaux, de leur structure, de leur physiologie et de leurs facultés." In the following collation each author's share in the work is indicated.

Baleine, *Balæna*, generalities of the subject, and account of the species, pp. 164–194, signed Virey. **1.** *Balæna mysticetus*, Linn., pp. 168–183, pl. cxl, fig. 1, juv., fig. 2, ad. from Scoresby; **2.** *Balæna glacialis*, Bonn., pp. 183–185; **3.** *Balæna gibbosa*, Linn. et Bonn., pp. 185–186; de la Pêche de la Baleine, pp. 186–194. Thus far by Virey. Then follows a nominal list of six species under French names, by Desmarest.

Baleinoptère, *Balænoptera*, pp. 194–201, mostly by Virey, with the interpolation of paragraphs by Desmarest. **1.** *Balænoptera gibbar*, Lacép., pp. 195–196, by Virey; **2.** *Balænoptera jubartes*, Lacép., *B. boops*, Gmel., pp. 196–198, by Virey; **3.** *Balænoptera rorqual*, Lacép.; *B. musculus*, Gmel., p. 198, partly by Desmarest and partly by Virey; **4.** *Balænoptera acuto-rostrata*, Lacép., *Balæna rostrata*, Gmel., p. 200, partly by Desmarest and partly by Virey.

Cachalot, *Physeter*, t. iv, 1816, pp. 525–534, signed, "Virey et Desm." General history of the group, pp. 525–532; **1.** *Physeter macrocephalus*, Shaw, pp. 532, 533; **2.** *Physeter trumpo*, Bonn., pp. 533; **3.** *Physeter catodon*, Linn. et Bonn., pp. 533, 534.

Dauphin, *Delphinus*, t. ix, 1817, pp. 146–180, partly by Virey and partly by Desmarest. External characters and general history (the first paragraph signed "Desm.," then about four pages signed "Virey," and about another page signed "B. V."), pp. 146–151; [1er Sous-genre, *Delphinorynchus*, Blainv.]. **1.** **Delphinus Geoffrensis*, Blainv., pp. 151, 152; **2.** **Delphinus coronatus* [Fréminville], pp. 152, 153; **3.** **Delphinus Shawensis*, Blainv. (*D. rostratus*, Shaw), pp. 153, 154; **4.** *Delphinus Pernettensis*, Blainv., p. 154; [2e Sous-genre, *Delphinus*, Blainv.]. **5.** **Delphinus delphis*, pp. 154–158; **6.** *D. chinensis*, Osbeck, p. 158; **7.** **D. dubius*, Cuv., p. 158; **8.** **D. tursio*, Bonn., p. 158; **9.** *D. tursio*, Fabr., p. 159; **10.** **D. rostratus*, Cuv., p. 160; **11.** **D. orca*, p. 161; **12.** *D. feres*, Bonn., p. 162; **13.** *D. canadensis*, Blainv., p. 163; **14.** *D. Bertini*, Duhamel, p. 163; [3e Sous-genre, *Oxypterus*, Rafines.]. **15.** *O. Mongitori*, Rafines., p. 103; [4e Sous-genre, *Phocæna*, Cuv.]. **16.** **Delphinus phocæna*, Linn., p. 163; **17.** *D. Peronii*, Lacép., p. 165; **18.** *D. Commersonii*, Lacép., p. 166; **19.** **D. gladiator*, Lacép., p. 166; **20.** *D. grampus*, Hunter, p. 168; **21.** **D. griseus*, Cuv., p. 169; **22.** *D. ventricosus*, Blainv., p. 169; **23.** **D. globiceps*, Cuv., p. 170; **24.** Dauphin de Risso, Cuv., *D. aries?* p. 172; [5e Sous-genre, *Delphinopterus*, Lacép.]. **25.** *D. leucas*, Gmel., p. 173; [6e Sous-genre, *Heterodon*, Blainv.]. **26.** *Anarnacus groenlandicus*, Lacép., p. 175; **27.** *D. Chemnitzianus* (*Balæna rostrata*, Chemn.), p. 175; **28.** *D. edentulus*, Schreb., p. 175; **29.** *D. biden-*

1816-17. VIREY, —, *et* [A. G.] DESMAREST—Continued.

tatus, Hunter, p. 176; **30.** *Hyperodon Butskopf*, Lacép., p. 176; **31.** *D. Sowerbensis*, Blainv., p. 177; **32.** *Epiodon urganantus*, Rafines., p. 177; **33.** **D. densirostris*, sp. n., p. 178 (based on a fragment of upper jaw); Dauphins fossiles, p. 179; French names of Dolphins, pp. 179, 180.

Species 1-25 are described by Virey, with the interpolation of a short paragraph by Desmarest in the account of no. 19, p. 167; species 26 to 33, as well as the remaining pages of the article, are by Desmarest.

Delphinus densirostris, Desm., sp. n., p. 178. The 14 species marked with an asterisk, the authors state (p. 151, note), are those whose validity is considered to be well established. In concluding, they state (p. 178): "Pour rectifer convenablement la synonymie de ces espèces, de nouveaux reneignemens nous sont absolument indispensables"; and for this purpose invite travelers and naturalists to give special attention to their descriptions, and direct attention to points to be observed.

In these articles the compilers have brought the subject thoroughly up to date; they not only include the species described since the time of Lacépède, but reject a few admitted by that author. Although strictly a compilation, it well represents the state of the subject at this date. [550.]

1816-29. CUVIER, F. Dictionnaire | des | Sciences naturelles. | — | Planches. | 2^{e} Partie: Règne organisé. | Zoologie. | — | Mammifères. | Par | M. Fréderic Cuvier, | Membre de l'Académie des sciences, chargé en chef de la Ménagerie royale. | — | Paris, | F. G. Levrault, libraire-éditeur, rue de la Harpe, n^{o}. 81, | Même maison, rue des Juifs, n^{o}. 33, à Strasbourg. | 1816-1829. 8^{o}. pp. 1-13, pll. col., i-c.

Cétacés (=*Sirenia* + *Cete*), pl. xcvi, fig. 1, Lamantin; pl. xcvii, fig. 1, Dugong des Indes, fig. 2, Delphinorhynque (=*Platanista*); pl. xcviii, fig. 1, Dauphin vulgaire, fig. 2, Heterodon à deux dents; pl. xcix, fig. 1, Narwal vulgaire, fig. 2, Cachalot macrocéphale; pl. c, fig. 1, Baleine franche (altered from Martens?) fig. 2, Baleinoptère Rorqual.

The plates themselves are not numbered, but in the "table des planches" (p. 4-13) these are numbered consecutively from 1-100, with a list of the names engraved on the plates and reference to the volume and page of the *Dictionnaire* where the species are describe. [551.]

1817. CUVIER, G. Le | Règne animal | distribué | d'après son organisation, | pour servir de base a l'histoire naturelle des ani- | maux et d'introduction a l'anatomie comparée. | Par M. le Ch^{er}. Cuvier, | . . . . [titles, 5 lines]. | Avec Figures, desinées d'après nature. | Tome I, | contenant | l'introduction, les Mammifères et les Oiseaux. | Chez Deterville, Libraire, rue Hautefeuille, n^{o}. 8. | — | De l'imprimerie de A. Belin, | 1817. 8^{o}. pp. i-xxxvii, 1-540.

This is the *editio princeps* of the celebrated *Règne animal*.

Huitième Ordre des Mammifères. Les Cétacés, pp. 271-287.

Les Cétacés herbivores = *Sirenia*; genera **1.** *Manatus*, p. 273, **2.** *Halicore*, p. 274, **3.** *Rytina*, p. 275; species not formally designated.

Les Cétacés ordinaires = *Cetacea*: Les Dauphins (*Delphinus*, L.), pp. 277-280. Les Dauphins proprement dits (*Delphinus*, Cuv.), pp. 277, 278. **1.** *Delphinus delphis*, L., p. 278; **2.** *D. rostratus*, Shaw, p. 278; **3.** *D. tursio*, Bonn., p. 278. Les Marsouins (*Phocæna*, Cuv., gen. n.), p. 279; **4.** Le Marsouin commun (*D. Phocæna*, L.), p. 279; **5.** L'Epaulard (*D. orca* et *D. gladiator*, Lacep.), p. 279. Les Delphinaptères (Lacep.); **6.** Le Beluga ou Epaulard blanc (*D. leucas*, Gm., *D. albicans*, Fabr.), p. 280; Les Hyperoodons (Lacep.), p. 280; [**7.** *D. edentulus*, Schreb.], p. 280. Les Narwals (*Monodon*, L.), pp. 280-282; **8.** *Monodon monoceros*, Lin., p. 281. Les Cachalots (*Physeter*, L.), pp. 282-284; [**9.** Cachalot macrocéphale de Shaw et de Bonn. *non* le macrocéphale de Linné], p. 283. Les Physétères (Lacep.), p. 284 [no species formally recognized]. Les Baleines (*Balæna*, L.), pp. 284-286; **10.** La Baleine franche (*B. mysticetus*, L.), pp. 285, 286; **11.** Le Nord-Caper (*B. glacialis*, Klein), p. 286. Les Balénoptères à ventre lisse, pp. 287, 288; **12.** Le Gibbar (*Balæna physalus*, L.), p. 287. Les Balénoptères à ventre plissé, p. 287; **13.** La Jubarte des Basques (*Bal. boops*, L.), p. 287.

Phocæna, gen. n., p. 279.

The treatment of the Cetacea here presented is strongly in contrast with that of Bonnaterre, Lacépède, and their followers, and even with that of still earlier systematists. While Cuvier rejects many of the fictitious species of the early authors, recognizing but a single species of Narwhal, and sagaciously hinting at the existence of only a single species of Cachalot, he runs to the opposite extreme among the Fin-Whales, rejecting species as too vaguely known that have since proved well-founded. We have here the foreshadowing of the wholesome conservatism later displayed by the author in his treatment of the Sirenians and Cetaceans in his *Ossemens fossiles*. [552.]

1817. DESMAREST, A. Dugong. <*Nouv. Dict. d'Hist. Nat.*, ix, 1817, pp. 603–604.

Résumé of its affinities as variously maintained by previous authors, with the recognition of the single species "*Trichecus dugong*, Gmel. [553.]

1817. DESMAREST, A. G. Lamantin. <*Nouv. Dict. d'Hist. Nat.*, xvii, 1817, pp. 258–264.

Generalities, pp. 258–261; Species, 262, 263; Lamantins fossiles, pp. 263–264. Spp. 2, *Manatus americanus* et *M. senegalensis*, Desm. [554.]

1817. DESMAREST, A. G. Mammalogie. <*Nouv. Dict. d'Hist. Nat.*, xviii, 1817, pp. 483–542.

History, including synopsis of classifications, pp. 483–526; external characters, pp. 526–542. [555.]

1817. EDITOR. Narrative of a Voyage to Hudson's Bay, in His Majesty's Ship Rosamond, containing some Account of the North-eastern Coast of America, and of the Tribes inhabiting that remote Region. By Lieut. Chappell. <*Quart. Rev.*, xviii, 1818, pp. 199–223. Map.

Review of the work. Contains a paragraph (p. 212) on Whales struck with the harpoon on the coast of Spitzbergen and afterward killed in Davis Strait. [556.]

1817. G[ERARDIN], S. Cachalot. <*Dict. des Sci. Nat.*, vi, 1817, pp. 38–83.

[Considérations générales], pp. 38–44. Première famille, Les Narwals, *Narwali*, pp. 44–49. **1.** Le Narwal vulgaire (*Monodon monoceros*, Linn.), pp. 45–48. **2.** Le Narwal microcéphale (*Narwalus microcephalus*, Lacép.), p. 48. **3.** Le Narwal andersonien (*N. andersonianus*), p. 49. Deuxième famille. Les Anarnaks, *Anarnaci*, pp. 49, 50. **4.** L'Anarnak groenlandois (*Anarnak grœnlandicus*, Lacép.), p. 49. Troisième famille. Les Cachalots proprement dits, *Catodontes*, pp. 50–59. **5.** Le Cachalot macrocéphale (*Physeter macrocephalus*, Gm.), pp. 50–56. **6.** Le Cachalot trumpo (*Catodon macrocephalus*, Gm.), pp. 56–58. **7.** Le Cachalot svineval (*Physeter catodon*, Gm.), p. 58. **8.** Le Cachalot blanchatre (*Catodon macrocephalus*, Var. B., Gm.), p. 58. Quatrième famille. Les Physales, *Physali*, pp. 59–61. **9.** Le Physale cylindrique (*Physalus cylindricus*, Lacép.), pp. 59–61. Cinquième famille. Les Physétères, *Physeteres*, pp. 61–65. **10.** Le Physétère mycrope (*P. mycrops*, Gm.), pp. 61, 62. **11.** Le Physétère orthodon (*B. mycrops*, Var. B., Gm.), pp. 63, 64. **12.** Le Physétère mular (*P. tursio*, Gm.), pp. 64, 65. Sixième famille. Les Delphinaptères, *Delphinapteri*, pp. 65–67. **13.** Le Delphinaptère béluga (*Delphinapterus leucas*, Gm.), pp. 65–67. **14.** Le Delphinaptère senédette (*Delphinapterus senedetta*, Lacép.), p. 67. Septième famille. Les Dauphins, *Delphini*, pp. 67–81. **15.** Le Dauphin vulgaire (*Delphinus delphis*, Gm.), pp. 68–71. **16.** Le Dauphin marsouin (*D. phocæna*, Gm), pp. 71–74. **17.** Le Dauphin orque (*D. orca*, Gm., Var. A.), pp. 74, 75. **18.** Le Dauphin gladiateur (*D. orca*, Gm., Var. B.), pp. 75–77. **19.** Le Dauphin nésernack (*D. nesarnack*, Lacép.), p. 77. **20.** Le Dauphin diodon (*D. diodon*, Lacép.), p. 78. **21.** Le Dauphin ventru (*D. ventricosus*, Lacép.), p. 78. **22.** Le Dauphin férès, *D. feres*. Lacép.), p. 79. **23.** Le Dauphin de Duhamel (*D. Duhamelii*, Lacép.), p. 79. **24.** Le Dauphin de Péron (*D. Peronii*, Lacép.), p. 80. **25.** Le Dauphin de Commerson (*D. Commersoni*, Lacép.), p. 81. Huitième et dernière famille des cachalots. Les Hypéroodons, *Hyperoodontes*, pp. 81–82. **26.** L'Hypéroodon butskopf (*D. orca*, Gm., Var. C.), pp. 81–83.

A compilation, mainly from Lacépède, whose nomenclature is followed. The species are the same as those recognized by Lacépède. [557.]

1817. [MILLAR, *or* MILLER, JAMES.] Cetology. <*Encycl. Brit.*, 5th ed., v, 1817, pp. 327–360, pll. cxl, cxli.

Chap. i. Of the Classification and Natural History of Cetaceous Fishes, pp. 328–341. Chap. ii. Of the Anatomy and Physiology of Cetaceous Fishes, pp. 341–353. Chap. iii. Of the Whale Fishery, pp. 353–359.

The genera recognized are, i, *Balæna*, ii, *Monodon*, iii, *Physeter*, iv, *Delphinus*. The species are the following: **1.** *Balæna Mysticetus*, pp. 329, 330, pl. cxl, fig. 1. **2.** *Balæna Glacialis*, pp. 330, 331. **3.** *Balæna Physalus*, p. 331. **4.** *Balæna Nodosa*, p. 331. **5.** *Balæna Gibbosa*, p. 332. **6.** *Balæna Boops*, p. 332. **7.** *Balæna Musculus*, p. 333. **8.** *Balæna Bostrata* [*sic*], p. 333. **9.** *Monodon Monoceros*, p. 334, pl. cxl, fig. 2. **10.** *Monodon Spurius*, p. 335. **11.** *Physeter Macrocephalus*, pp. 334, 335, pl. cxl, fig. 3. **12.** *Physeter Catodon*, p. 336. **13.** *Physeter Trumpo*, p. 336. **14.** *Physeter Cylindricus*, p. 337. **15.** *Physeter Microps*, p. 337. **16.** *Physeter Mular*, p. 337. **17.** *Delphinus Phocæna*, p. 338. **18.** *Delphinus Delphis*, pp. 338, 339. **19.** *Delphinus Tursio*, p. 339. **20.** *Delphinus Orca*, p. 339, pl. cxl, fig. 4. **21.** *Delphinus Gladiator*, p. 310. **22.** *Delphinus Leucas*, p. 340. **23.** *Delphinus Bidentatus*, p. 340. **24.** *Delphinus Butskopf*, pp. 340, 341. **25.** *Delphinus Feres*, p. 341.

Pl. cxli gives views in profile of two skulls of Whales, and views of baleen from side, above, etc. The 4 figures of Whales given in pl. cxl are copies of well-known figures.

1817. [Millar, *or* Miller, James]—Continued.

This article appeared originally in the 4th ed. of the *Encycl. Brit.* (1810), according to the preface of the present (5th) ed., and is by the editor, Dr. James Millar. It is as fair a presentation of the subject as could be expected from a writer merely qualified to glean from respectable sources. [558.]

1818. Blainville, [H.] de. Mammifères, *Mammalia*. <*Nouv. Dict. d'Hist. Nat.*, xix, 1818, pp. 1–152. [559.]

1818. Desmarest, A. E. Mammifères fossiles. <*Nouv. Dict. d'Hist. Nat.*, xix, 1818, pp. 152–156. [560.]

1818. Desmarest, A. E. Narwhal, *Narwhalus*. <*Nouv. Dict. d'Hist. Nat.*, xxii, 1818, pp. 224–228.

Species: **1.** *Narwhalus vulgaris*, Lacép., p. 224; **2.** *N. microcephalus*, Lacép., p. 227; **3.** *N. andersoni*, Lacép., p. 228. [561.]

1818. Egede, Hans. A | Description of Greenland. | By Hans Egede, | who was a Missionary in that country | for | twenty-five years. | — | A New Edition. | — | With an | Historical Introduction | and | a Life of the Author. | Illustrated | with a map of Greenland, and numerous engravings on wood. | Second Edition. | [Vignette.] London: | Printed for T. and J. Allman, | Frances Street, Hanover Square; | W. H. Reid, Charing Cross; and Baldwin, Cradock and Joy, | Paternoster Row. | 1818. 8°. pp. i–cxviii, 1–225, map and woodcuts.

Chap. vi. Of the Greenland Sea Animals, and Sea Fowls and Fishes, pp. 66–99. Cetaceans are treated pp. 66–82.

For the *editio princeps*, *see* 1741. [562.]

1818. Fabricius, Otho. Zoologiske Bidrag. <*Kongel. Danske Videnskab.-Selsk. Skrivter*, vi, Deel 1 (for 1809–1810), 1818, pp. 57–138.

2det Bidrag. Om Stub-Hvalen, *Balæna Boops*, Linn., pp. 63–83. [563.]

1818. Fabricius, Otto. Nöjogtig Beskrivelse over Grönlænddernes Landdyr-, Fugle- og Fiskefangst med dertil hörende Redskaber. <*Kongel. Danske Videnskab.-Selsk. Skrivter*, vi, Deel 2 (for 1811–1812), 1818, pp. 231–272.

III. Fiskefangst og dertil hörende Redskaber, pp. 253–272. Hvalfangst, pp. 253–256. [564.]

1818. Freminville, [C. P. de la Poix de.] Sur une nouvelle espèce de Dauphin. <*Bull. des Sci. par la Soc. philom. de Paris*, 1818, pp. 67, 68.

Delphinus globiceps? [565.]

1818. Herausgebers. Ueber den Bau des *Beluga* (*Delphinus albicans* Linn. *Delphinapterus beluga* Lacépède). Von Barclay. (Aus Thomson's Annals of Philosophy. Vol. ix, p. 233 ff.) <*Deutsches Archiv f. Physiol.*, iv, 1818, pp. 296–298.

Auszug. [566.]

1818. Home, E. A description of the teeth of the Delphinus Gangeticus. <*Philos. Trans. Lond.*, [cviii], pt. 2, art. xxi, 1818, pp. 417–419, pl. 20.

Figures of the upper and under jaws and of isolated teeth. [567.]

1818. "Kat, H. D. Dagboek eener reize ter walvisch en- robbenvangst, gedaan in 1777 en 1778. Haarlem, Wed. P. Loosjes, 1818. 8°. Met eene Kaart en portret."

Not seen; from Bosgoed, *op. cit.*, p. 240, no. 3493. [568.]

1818. Lacépède, [B. G. Ét.]. Note sur des Cétacées des mers voisines du Japon. <*Mem. du Mus. d'Hist. nat.*, iv, 1818, pp. 467–475.

Balæna japonica, *Balæna lunulata*, *Balænoptera punctulata*, *Balænoptera nigra*, *Balænoptera cœrulescens* (p. 473), *Balænoptera maculata*, *Physeterus sulcatus* (p. 474), *Delphinus niger* (475), spp. nn.

"Les dessins coloriés d'après lesquels j'ai décrit ces huit espèces de cétacées japonois, ont été communiqués au Muséum royal d'Histoire naturelle, par M. Abel de Rémusat, membre de l'Académie des Inscriptions et Belles-Lettres. Ils présentent pour les caractères distinctifs, une grande netteté, et tous ces signes de l'authenticité et de l'exactitude que les zoologistes sont maintenant si accoutumés à reconnoitre; et voici les traits particuliers de ces huit espèces" (p. 409).

This highly reprehensible piece of work has received just condemnation at the hands of most writers who have had occasion to treat of the Cetacea of the Japan seas, and the spe-

1818. Lacépède, [B. G. Ét.]—Continued.

cies, when not wholly ignored, go to swell the list of those which are indeterminable. Allowing that the drawings were reasonably correct, which is far from probable, the characters drawn from them are so vague and general that the diagnoses are valueless as a scientific basis. There is, furthermore, no assurance that the drawings were even attempts at *facsimile* representations of natural objects. With the nine species described six years later by Chamisso from Japanese wooden models, and those described by Rafinesque, Lesson, and others, from observation of animals swimming in the sea, they form altogether a fine rubbish pile, but one which need give little trouble, since the species are quite unworthy of any attemp at recognition, only showing to how great a depth of folly the vanity of authorship may sometimes lead. [569.]

1818. O'Reilly, B. Greenland, | the | Adjacent Seas, | and | the North-west Passage | to | the Pacific Ocean, | illustrated in a voyage to Davis's Strait, | during the Summer of 1817. | — | With charts and numerous plates, | from drawings of the author taken on the spot. | — | By | Bernard O'Reilly, Esq. | — | London: | printed for Baldwin, Cradock, and Joy, | 47, Paternoster-Row. | — | 1818. 1 v. 4°. pp. i-viii, 1-293, pll. i-xviii+3 charts.

Chap. v, Arctic Zoology, pp. 96-148. *Monodon Monoceros*, pp. 104-107. "*Balæna Mysticetus* (the common Whale)," pp. 107-130, pl. x, fig. 3, transverse section of body at lumbar region, fig. 4, section of tail, fig. 5, animal, figg. orig. "*Balæna Mysticetus* (the finner)," pp. 130, 131. *Delphinus Orca*, pp. 132-134. *Delphinus Leucas*, pp. 134, 135, pl. x, fig. 1. There are incidental allusions to other species at pp. 131, 132.

Although the author was not without opportunity of observing the northern Cetacea, and especially the *Balæna mysticetus*, he contributes nothing of importance to the subject, but on the other hand, displays gross ignorance respecting many points touched upon. The name *Balæna mysticetus* is first employed in its correct sense (p. 107), but later, doubtless by inadvertence, is used to designate "the finner Whale." From one who describes the "Sword Grampus" as having the dorsal fin long and *bony*, growing longer with age, etc., and who states that the *Balæna mysticetus* "received its specific name from the Scriptural record of the adventure of Jonas," little can be expected in the way of new information. [570.]

1818. Saabye, Hans Egede. Greenland: | being | Extracts from a Journal | kept in that Country | in the Years 1770 to 1778. | By Hans Egede Saabye, | Formerly ordained Minister in the Districts of Clanshavn and Christianshaab; | now Minister of Udbye, in the Bishopric of Fühnen; and | Grandson of the celebrated Hans Egede. | (Now first published.) | — | To which is prefixed | An Introduction; containing some | Accounts of the Manners of the Greenlanders, | and of the | Mission in Greenland; | with various interesting information respecting | the Geography, &c., of that Country; | And illustrated by a | Chart of Greenland, | By G. Fries. | — | Translated from the German. | — | London: | Printed for Boosey and Sons, | 4 Broad Street, Royal Exchange, | — | 1818. 8°. pp. i-viii, 1-293.

There is a short account of the Whalefishery, as carried on by the Greenlanders, at pp. 29, 30. Reference to trade in "unicorn horns," p. 101. Chapter xiii. The Whale found, pp. 190-195, recounts the behavior of the Greenlanders on finding a Whale, and their manner of procedure in saving its products.

For the *ed. prin.* see 1741. Besides the German edition of this work, of which the present is a translation, a Dutch version appeared in 1818. *See* Bosgoed, *op. cit.*, p. 247, no. 3552. [571.]

1819. Anon. Skeleton of a Whale found in Clackmannanshire. <*Blackwood's Edin. Mag.*, v, 1819, p. 737.

Account of the exhumation of the skeleton, with measurements of some of the principal bones. [572.]

1819. Anspach, L. A. A | History | of the | Island of Newfoundland: | containing a | Description of the Island, | The Banks, the Fisheries, | and | Trade of Newfoundland, | and the | Coast of Labrador. | Illustrated with Two Maps. | — | By the | Rev. Lewis Amadeus Anspach, | Late a Magistrate of that Island and Missionary for the District | of Conception Bay. | — | London: | Printed for the Author, | And Sold by T. and J. Allman, Princes-Street, Hanover- | Square; and J. M. Richardson, 23, Cornhill, opposite | the Royal Exchange. | — | 1819. 8°. pp. i-xxviii, 1-512.

Contains, pp. 396-399, a short notice of the Whale-fishery formerly carried on along the eastern coast of North America. [573.]

1819. ARNAULT, *M.* Sur les coquilles et des ossements fossiles, découverts et observés dans les environs d'Anvers. <*Ann. générales des Sci. phys.*, ii, 1819, pp. 124–128.

Trois vertèbres énormes; "elles furent évidemment celles de quelque cétacée de la plus grande taille" (p. 127). [574.]

1819. BALD, ROBERT. Notice respecting the discovery of the Skeleton of a Whale on the Estate of Airthrey, near Stirling, the property of Sir Robert Abercromby, Baronet. <*Edinb. Philos. Journ.*, i, no. 2, art. xxxii, 1819, pp. 393–396.

Particulars of the finding and exhumation of a skeleton "which is evidently that of a Whale," which "appears to have been about 72 feet in length." [575.]

1819. CORTESI, GIUSEPPE. Saggi Geologici | degli Stati di Parma e Piacenza | Dedicati | a Sua Maestà | la Principessa Imperiale | Maria Luigia | Arciduchessa d' Austria | Duchessa | di Parma Piacenza Guastalla ecc. ecc. | dal guidice | Giuseppe Cortesi | Professore Onorario | di Geologia | Piacenza | Dai Torchj del Majno | MDCCCXIX. 4°. ll. 4, pp. i–x, 1–165, pll. i–vii.

Articolo IV. Degli Scheletri di Baleno e di altri Cetacei, pp. 45–67, pll. ii–iv.

Description (p. 48) and figure (pl. ii, fig. 1, skull) of a fossil Dolphin, which later was named *Delphinus Cortesii* by Desmoulin, and a fossil Whale (p. 61, pl. v, fig. 1, skeleton), afterwards named *Balæna Cortesii* by Desmoulins. [576.]

1819. DESMAREST, A. G. Rytine, *Rytina*, Ill. <*Nouv. Dict. d'Hist. nat.*, xxix, 1819, pp. 573–576. [577.]

1819. "HELLWIG, JOH. CHR. LUDW. Tabellarische Uebersicht der Ordnungen, Familien u. Gattungen der Säugethiere, nach Illigers prodromus system. Mammalium, mit Aufführung aller Arten, welche der Verf. nach den Schreberschen Säugthieren u. nach den Werken Anderer zu seinen Gattungen zog, in 65 Tabellen. gr. 8°. Helmstädt, 1819."

Not seen: title from Carus and Engelmann. [578.]

1819. HUMBOLDT, ALEXANDER VON. Voyage | aux Régions Équinoxiales | du Nouveau Continent, | fait en 1799, 1800, 1801, 1802, 1803 et 1804, | par Al. de Humboldt et A. Bonpland; | rédigé | Par Alexandre de Humboldt. | Avec deux Atlas, | qui renferment, l'un les vues des Cordillères et les monumens des peuples indigènes | de l'Amérique, et l'autre des cartes géographiques et physiques. | — | Tome [premier,] second [et troisième]. | — | A Paris, | Chez N. Maze, Libraire, rue Git-le-Coeur, N°. 4. | — | [1814,] 1819 [1825]. Vol. ii, 3 ll., pp. 1–722. 3 vols. 4°. Vol. i, 1814; vol. ii, 1819; vol. iii, 1825.

Souffleurs, ii, pp. 201, 202. Manati ou Lamantin, ii, pp. 226–228, 606. [579.]

1819. "MATTHIESEN. Ein Steindruck [Balaenoptera rostrata]. Hamburg, 1819."

Not seen; reference from Reichenbach, *Walthiere*, p. 22, note. [580.]

1819. PSEUDON. Journal | of a | Voyage of Discovery, | to the | Arctic Regions, | performed between the 4th of April and the 18th of | November, 1818, | in His Majesty's Ship Alexander, | W[illia]m Edw[ard]. Parry, Esq., Lieut. and Commander. | — | By an officer of the Alexander. | — | London: | Printed for Richard Phillips; by G. Sidney, Northumberland-street, Strand. | [No date. "March 15, 1819" in MS.] 8°. pp. i–viii, 1–104, map, and pll. i–iii. The signature mark is "Voyages and Travels, No. 1, Vol. I."

Appendix, No. viii. A brief Sketch of the Quadrupeds, Birds, and Fishes, seen by those employed on the late Expedition to Davis' Straits and Baffin's Bay, pp. 99–104.

"Fishes" (*i. e.*, *Cetacea* and *Pinnipedia!*), p. 104. *Balæna mysticetus*, *Balæna Physalus*, *Phoca*, *Monodon Monoceros*. Brief remarks on each. At pp. 42–44 is given a rather detailed account of the "female fish" (*Balæna mysticetus*) taken by a Hull whaler, giving account of external characters, baleen, measurements, etc. [581.]

1819. ROSS, J. A | Voyage of Discovery, | made under the orders of the Admiralty, | in | His Majesty's ships | Isabella and Alexander, | for the purpose of | exploring Baffin's Bay, | and inquiring into the probability of a | North-west Passage. | — | By John Ross, K. S. Captain Royal Navy. | — | London: | — |

1819. Ross, J.—Continued.
John Murray, Albemarle-street. | — | 1819. 1 vol. 4°. ll. 2, pp. i–xl, 1–252, 1 l., pp. i–cxliv, maps, plates.

Appendix ii. Zoological Memoranda. Mammalia, pp. xli–xlvii.

Balæna Mysticetus, pp. xlvi, xlvii. Description of a specimen 46 feet long. No other Cetacean mentioned. [582.]

1819. Ross, J. A | Voyage of Discovery, | made under the orders of the Admiralty, | in | His Majesty's Ships | Isabella and Alexander, | for the purpose of | Exploring Baffin's Bay, | and enquiring into the probability | of a | North-West Passage. | — | By John Ross, K. S. Captain Royal Navy. | — | Second edition. | In two volumes. | Vol. I[–II]. | — | London: | Printed by Strahan and Spottiswoode, Printers-Street; | for Longman, Hurst, Rees, Orme, and Brown, | Paternoster Row. | 1819. | 2 vols. 8°. Vol. i, pp. i–lxix, 1–265, 1 double map; vol. ii, pp. i–ii, 1–258, 1 double plate.

Appendix no. iv. Zoological Memoranda, vol. ii, pp. 145–179. Mammalia, pp. 145–153. See the 4° ed. (last title). [583.]

1819. Scoresby, William, *jr.* Remarks on the Size of the Greenland Whale, or *Balæna Mysticetus*, designed to show that this animal is found of as great dimensions in the present day as at any former period since the establishment of the whale-fishery. <*Edinb. Philos. Journ.*, i, 1819, pp. 83–88. [584.]

1820. Anon. Grösse des grönländischen Wals, *Balæna mysticetus* L. <*Isis von Oken*, vi, 1820, pp. 506, 507.

Auszug aus *Edinb. Phil. Journ.*, i, 1819, pp. 83–88. [585.]

1820. Camper, Pierre. Observations Anatomiques | sur | la structure intérieure et le squelette | de plusieurs espèces | de Cétacés. | Par Pierre Camper, | . . . [=titles, 4 lines.] | Publiées par son fils, Adrien-Gilles Camper, | . . . [=titles, 3 lines]. | Avec des Notes par M. G. Cuvier, | . . . [=titles, 1 line]. | On y a ajouté un Atlas composé de 53 Planches, dont 3 sont en couleur. | Ouvrage qui peut faire suite aux Annales et Mémoires du Muséum | d'Histoire naturelle, et aux Recherches sur les Ossemens | fossiles des Quadrupèdes, par M. Cuvier. | — | Paris, | Chez Gabriel Dufour, Libraire, | Rue de Vaugirard, N°. 34. | — | 1820. 4°. ll. 2, pp. 1–218.

The Atlas has the following title:

Recueil de Planches | pour servir | aux observations anatomiques | sur | la structure intérieure et le squelette | de plusieurs espèces | de Cétacés, | Par MM. Camper, Père et Fils. | cinquante-trois planches, dont trois en couleur. | — | A Paris, | Chez Gabriel Dufour, Libraire, | Rue de Vaugirard, N°. 34. | — | 1820. 2°. ll. 2, pll. i–liii. [l. 2, Table.]

Discours préliminaire, pp. 1–8. Observations anatomiques, etc. Première Partie. Chapitre premier. Vues générales sur la nature des Cétacés, pp. 9–18. Chapitre II. Sur la Classification des Cétacés, pp. 18–25. Chapitre III. Sur les Cétacés du premier ordre, ou Cétacés a fanons, pp. 26–41. Chapitre IV. Sur la Forme extérieure et la Structure des parties intérieures de la Baleine franche, pp. 41–52. Chapitre V. Sur la Structure de l'appareil digestif, circulatoire et sexuel, ainsi que sur quelques Particularités du squelette, pp. 52–58. Chapitre VI. Sur l'Ostéologie du crâne des Baleines, pp. 58–73. Chapitre VII. Sur l'ostéologie d'un Baleinoptère Gibbar, *Physalus* de Linné, pp. 74–77. Chapitre VIII. Sur l'Ostéologie du crâne d'un Cétacé que nous croyons être le Baleinoptère *Museau pointu*, ou *Balæna rostrata* de Linné, pp. 78–86. Note génerale sur la première partie, pp. 86, 87.

Seconde Partie. Chapitre I^{er}. Sur la Classification du second ordre, ou du genre du Cachalot, pp. 88–94. Chapitre II. Sur l'Ostéologie du crâne des Cachalots, pp. 94–110.

Troisième Partie. Sur les Cétacés du troisième ordre, ayant les mâchoires supérieures et inférieures armées de dents. Chapitre I^{er}. Sur les Dauphins en général, pp. 111–114. Chapitre II. Sur la première famille des Dauphins, ou les Narwals, pp. 114–118. Chapitre III. Sur l'Ostéologie du crâne du Narwal monodon, pp. 118–121. Chapitre IV. Sur le crâne du Narwal édenté, du Musée royal de France, pp. 121–124. Chapitre V. Sur les Dauphins armés de dents dans les mâchoires supérieures et inférieures, pp. 124–126. Chapitre VI. Sur l'Oudre, pp. 126–130. Chapitre VII. Observations anatomiques sur le Dauphin *vulgaire*, pp. 131–141. Chapitre VIII. Description anatomique du Dauphin Marsouin, Delphinus Phocæna, pinna in

1820. CAMPER, PIERRE—Continued.

dorso una, rostro brevi obtuso de *Brisson*, pp. 142–157. Chapitre IX. Sur la Structure du Crâne des diverses familles de Cétacés, considérée dans ses rapports avec celle du crâne de l'Homme, pp. 157–163.

Explication des Planches, pp. 164–216. Table des chapitres contenus dans cet ouvrage, pp. pp. 217, 218.

Sujets figurées: Embryon d'une baleine franche, pll. i–iii; crâne d'une jeune baleine franche, pll. iv–vi; profile du crâne d'une autre baleine, dans laquelle on a conservé les fanons, pl. vii; de l'organe de l'ouïe des baleines, pll. viii, ix; mâchoires inférieures d'une baleine, pl. x; le crâne d'un Baleinoptère Gibbar (*Physalus* de Linné), pll. xi, xii; crâne du baleinoptère museau pointu (*Balæna rostrata* de Linné), pll. xiii–xvi; crâne d'un cachalot conservé dans le chœur de l'église de Schevelinge, proche la Haye, pll. xvii, xx–xxii; crâne d'un cachalot macrocéphale, pll. xviii, xix; ostéologie de l'oreille du cachalot, pll. xxiii–xxvi; les mâchoires inférieures d'un cachalot, pl. xxvii; vertèbres cervicales d'un cachalot et l'atlas d'une baleine, pl. xxviii; crâne du narwal, pll. xxix–xxxi; crâne d'un narwal édenté, pll. xxxii–xxxiv; crâne d'un dauphin vulgaire, xxxv–xl; vertèbres cervicales des plusieurs espèces de dauphins, pl. xli; vertèbres cervicales d'un marsouin, et d'une vertèbre cervicale d'un grand cétacé du Musée britannique, avec quelques vertèbres lombaires, sacrées, etc. d'un dauphin vulgaire, pl. xlii; myologie de l'extrémité pectorale du dauphin vulgaire, pl. xliii; les épaules de différentes espèces de cétacés, ainsi que les os du bras du dauphin vulgaire, pl. xliv; le dauphin marsouin, en profil et ouvert, pll. xlv–xlvii; la structure des narines, de l'œil et de larynx, du dauphin marsouin, pl. xlviii; crâne du marsouin, pl. xlix; tête d'un marsouin, pl. l; cerveau d'un marsouin nouveau-né, pl. li; profil d'un fœtus mâle du marsouin; les parties sexuelles d'un fœtus femelle; osselets pelvienne; portion supérieure du tube alimentaire; l'omoplate, tous du même espèce, pl. lii; analogie du crâne des cétacés avec celui de l'homme, etc., pl. liii. [586.]

1820. DONOVAN, E. The | Natural History | of | British Quadrupeds; | consisting of coloured figured, | accompanied with | Scientific and general descriptions, | of all the species that are known to inhabit | the British Isles: | including | as well those found in a wild as in the domesticated state; | and also such as are | clearly authenticated to have been originally indigenous, but are now | extirpated, or become extremely rare; the whole arranged in systematic order, after the manner of Linnæus. | — | By E. Donovan, F. L. S. W. S. | Author of the Natural Histories of British Birds, Fishes, Insects, Shells, &c. | — | In three volumes, | Vol. I [II, III]. | — | London: | Printed for the Author: and for F. C. and J. Rivington, 62, St. Paul's Church-yard, and 3, Waterloo-Place, Pall-Mall. | — | 1820. 8°. pll. i–lxxii, with several unpaged folios of text to each.

1. *Balæna rostrata*, pl. xxiv, and 1 p. of text. **2.** *Balæna physalus*, pl. xxxv, and 3 pp. of text. **4.** *Delphinus orca*, pl. lvii, and 3 pp. of text. **5.** *Delphinus ? bidens*, pl. lxvii, and 3 pp. text. [587.]

1820. GOLDFUSS, G. A. Handbuch | der | Zoologie. | Von | Georg August Goldfuss, | . . . [=titles, 11 lines, and monogram.] | Zweite Abtheilung. | — | Nürnberg, | bei Johann Leonhard Schrag. | 1820. <Handbuch | der Naturgeschichte, | Zum Gebrauch | bei Vorlesungen. | Von | Dr. G[otthilf]. H[einrich von]. Schubert. | — | Dritter Theil. | Zweite Abtheilung. | — | Nürnberg, | bei Johann Leonhard Schrag. | 1820. | 8°. pp. i–xxiv, 1–510.

Systematische Uebersicht der Gattungen, pp. v–xxiv (*Cetæ* and *Sirenia*, p. xix,—list of genera and subgenera).

Erste Ordnung, *Cete*, Walle, pp. 300–336. **1.** *Balaena mysticetus*, **2.** *Balaenoptera rostrata*, **3.** *B. boops*, **4.** *Physeter* (*Physalus*) *gibbosus*, **5.** *Physeter* (*Catodon*) *macrocephalus*, **6.** *Physeter* (*Physeter*) *Microps*, **7.** *Ancylodon groenlandicus*, **8.** *Ceratodon monoceros*, **9.** *Delphinus* (*Hyperoodon*) *bidens*, **10.** *D.* (*Delphinapterus*) *Leucas*; **11.** *D.* (*Delphinus*) *Delphis*, **12.** *D.* (*Phocaena*) *Phocaena*, **13.** *D.* (*Phocaena*) *Orca*; =6 genera, 7 subgenn., 13 spp.

Zweite Ordnung. *Sirenia*, Sirenen, pp. 336–339, **1.** *Rytina Stelleri*, **2.** *Manatus australis*, **3.** *Halioone* (lege *Halicore*) *indica*. [588.]

1820. HOME, E. On the milk tusks, and organ of hearing of the Dugong. <*Philos. Trans. Lond.*, [cx], pt. 2, art. ix, 1820, pp. 144–155, pll. xii–xiv.

The plates give profile and basilar views of the skull, section of the tusk, milk dentition, lower jaw, incisors, and section of molars. [589.]

1820. HOME, E. Particulars respecting the anatomy of the Dugong, intended as a Supplement to Sir T. S. Raffles' Account of that animal. <*Philos. Trans. Lond.*, [cx], pt. 2, art. xx, 1820, pp. 315–323, pll. xv–xxxi.

The observations were made on a young female, and the viscera of a male, eight feet long. Pl. xxv, animal; pll. xxvi, xxvii, stomach, tongue, and cæcum; pl. xxviii, heart; pl. xxix, part of trachea and portion of lungs; pl. xxx, sexual organs; pl. xxxi, sternum and pelvic bones. [590.]

1820. "KÖHLER, FR. GOTTL. Reise ins Eismeer und nach den Küsten von Grönland und Spitsbergen im Jahre 1801, und Beschreibung der Wallfischfang. Leipzig, 1820. 8°."

Not seen; from Bosgoed, *op. cit.*, p. 240, no. 3494. [591.]

1820. "KÖHLER, FR. GOTTL. Reis naar de IJszee en naar de kusten van Groenland en Spitsbergen, in het jaar 1804. Benevens eene beschrijving van de walvischvangst. Naar het Hoogduitsch. Te Amsterdam, bij J. C. van Kesteren 1820. gr. 8°."

Not seen; from Bosgoed, *op. cit.*, p. 240, no. 3495. Apparently a translation of the last, although the date of the voyage is in the one case 1801, and in the other 1804. [592.]

1820. RAFFLES, T. S. Some account of the Dugong. <*Philos. Trans. Lond.*, [cx], pt. 2, art. xiii, 1820, pp. 174–182.

External characters, anatomy, and habits. [593.]

1820. RANZANI, CAMILLO. Elementi | della | Storia naturale | dei Mammiferi | dell' abate | Camillo Ranzani | Professore di Mineralogia, e di zoologia | nella pontificia Università | di Bologna. | — | Volume Primo [Secondo e Terzo, mut. mut.]. | — | Bologna. | — | Per le Stampe di Annesio Nobili | 1820. 8°. pp. 1–736, l. 1, pll. i–xiii (the three volumes are continuously paged).

Ordine ottavo de Cetacei, pp. 668–708.

Famiglia prima. De Cetacei erbivori, pp. 670–677. **1.** *Manatus americanus*, p. 673; **2.** *Halicore Dugong*, p. 674; **3.** *Rytina Stelleri*, p. 676.

Famiglia seconda. De Cetacei carnivori, pp. 677–708. **1.** *Delphinus Geoffrensis*, p. 682; **2.** *Delphinus coronatus*, p. 682; **3.** *Delphinus Delphis*, p. 683; **4.** *Delphinus Tursio*, p. 685; **5.** *Delphinus Mongitori*, p. 686; **6.** *Delphinus Phocaena*, p. 687; **7.** *Delphinus Beluga*, p. 688; **8.** *Delphinus Urganantus*, p. 689; **9.** *Delphinus Diodon*, p. 690; **10.** *Ceratodon vulgaris*, p. 691; **11.** *Physeter macrocephalus*, p. 695; **12.** *Balaena Mysticetus*, p. 701 (pl. xiii, fig. 1); **13.** *Balaena Fisalis*, p. 705; **14.** *Balaena Boops*, p. 706. [594.]

1820. SCORESBY, W., *jr.* An | Account | of the | Arctic Regions, | with a | History and Description | of the | Northern Whale-Fishery. | By W[illiam]. Scoresby Jun. F. R. S. E. | Illustrated by Twenty-four Engravings. | In Two Volumes. | — | Vol. I [-II]. | — | Edinburgh: | Printed for Archibald Constable and Co. Edinburgh: | and Hurst, Robinson & Co. Cheapside, London. | — | 1820. 2 vols. 8°. Vol. i, pp. i–xx, 1–551+1–82 and frontisp.; vol. ii, pp. i–viii, 1–574, pll. i–xxii (including maps)+xii.*

A Sketch of the Zoology of the Arctic Regions, i, pp. 446–551. Sect. I. A Description of Animals, of the Cetaceous Kind, frequenting the Greenland Sea, pp. 449–501. **1.** *Balæna Mysticetus*, pp. 449–478, pl. xii, figg. 1, 2, xii [bis]; **2.** *Balænoptera Gibbar*, La Cepède; *B. Physalis* of Linné, pp. 478–482. **3.** *Balæna Rorqual* (La Cepède) *Balæna Musculus* of Linné, or Broad-nosed Whale, pp. 482, 483. **4.** *Balænoptera Jubartes* (La Cepède)—*Balæna Boops* of Linné, or *Finner* of the Whale-fishers, pp. 484, 485. **5.** *Balænoptera Acuto-rostrata* (La Cepède)—*Balæna rostrata* of Linné, or Beaked Whale, pp. 485, 486, pl. xiii, fig. 1. **6.** *Monodon Monoceros* (Linné)—Narwal, or Unicorn of the Whalers, pp. 486–495, pl. xii, fig. 3, pl. xv, figg. 1, 2. **7.** *Delphinus Deductor* (Traill)—Ca'ing or Leading Whale, pp. 496–500, pl. xxii, fig. 1. **8.** *Delphinapterus Belupa* (La Cepède)—*Delphinus leucas* of Linné; *Beluga* of Pennant, or White Whale of the fishers, pp. 500, 501, pl. xiv.

Pl. xvi, Medusæ, &c., (*i. e.*, "Whale's Food"). Pll. xvii, xix–xxii, Instruments and Apparatus used in the Whalefishery.

Account of the Northern Whale-Fisheries, &c., ii, pp. 1–537. Chap. i. Chronological History of the Northern Whale-Fisheries, pp. 1–95. Chap. ii. Comparative View of the Origin, Progress, and Present State of the Whale-Fisheries of the different European Nations, pp. 96–171. Chap. iii. Situation of the Early Whale-Fishery,—Manner in which it was conducted,—and the Alterations which have subsequently taken place, pp. 172–186. Chap. iv. Account of the Modern Whale-Fishery, as conducted at Spitzbergen, pp. 187–381. Chap.

1820. SCORESBY, W., *jr*.—Continued.

v. Account of the Davis' Straits Whale-Fishery, and a comparison with that of Greenland, with Statements of Expences and Profits of a Fishing Ship, pp. 382–396. Chap. vi. Methods of Extracting Oil and Preparing Whalebone, with a Description of these Articles, and remarks on the uses to which the several products of the Whale-Fishery are applied, pp. 397–437. Chap. vii. Narrative of Proceedings on board of the Ship Esk, during a Whale-Fishing Voyage to the coast of Spitzbergen, in the year 1816, pp. 438–488. Appendix, pp. 489–558.—I. Abstract of the Acts of Parliament at present in force for the Regulation of the Whale-fishery of Greenland and Davis' Straits, pp. 491–505. II. Some Remarks on the most advantageous Dimensions of a Whale-Ship, [and] Further Notices respecting the Fortifications of a Greenland Ship, pp. 506–509. III. Schedule of the Principal Fishing Apparatus necessary for a Ship, of 300 tons burden or upwards, intended to be employed in the Greenland Trade, pp. 509–511. IV. . . . Manner of Mustering the Crew of Whale-Ships . . . pp. 512–518. V. Account of a Trial respecting the right of the Ship Experiment, to a Whale struck by one of the Crew of the Neptune; Gale *v.* Wilkinson, pp. 518–521. VI. Signals used in the Whale-fishery, pp. 521–525. VII. Account of Some Experiments for determining the Relations between the Weight and Measure, in certain quantities of Whale-Oil, pp. 525–528. VIII. Some account of the Whale Fishery conducted in the Southern Seas, pp. 529–537. IX. On the Anomaly in the Variation of the Magnetic Needle, as observed on Ship-board, pp. 537–554. X. Explanation of the Plates, pp. 554–558.

Scoresby's *Arctic Regions* is well known as one of the most important contributions to the history of the Greenland Whale (*Balæna mysticetus*) and the Northern Whale-fishery extant, and as the source whence many later writers on the subject have largely derived their materials. His figures of the Greenland Whale are the best published prior to 1874, and those of the Narwhal are also excellent. Those of the other species were copied from previous writers, and his brief notices of the other Cetaceans he describes were mostly given at second hand, and indicate that he knew little about them from personal observation. His four species of *Balænoptera* are all to be referred to *Physalus antiquorum*, auct. (=*Balænoptera musculus*). His nomenclature is that of Lacépède. Failing to recognize the Nordkaper (*Balæna biscayensis* of recent European cetologists) as a distinct species, he has confounded its history, in his historical summary of the Northern Whale-fishery, with that of *Balæna mysticetus*. Not meeting with the former, for now obvious reasons, in any of his Whaling expeditions, he was very naturally led to disbelieve in its existence as a species distinct from the Greenland Whale. [595.]

1821. BLUMENBACH, J. F. Handbuch | der | Naturgeschichte | von | Joh. Fried. Blumenbach. | — | Multa fiunt eadem sed aliter. | Quintilian. | — | Zehnte Ausgabe. | — | Göttingen, | in der Dieterichschen Buchhandlung. | 1821. sm. 8°. pp. i–xiv, 1–814, pll. i, ii.

VIII. *Palmata*, pp. 131–136. *Trichechus Manatus*, p. 136.

Cetacea, pp. 137–140. 1. *Monodon Narwhal*, p. 137; 2. *Balæna Mysticetus*, p. 137; 3. *B. Rostrata*, p. 138; 4. *Physeter Macrocephalus*, p. 139; 5. *Delphinus Phocaena*, p. 139; 6. *D. Delphis*, p. 140; 7. *D. Orca*, p. 140.

B. Rostrata replaces *B. Physalus* of the early editions, and the text is greatly changed. [596.]

1821. BOWDICH, T. E. An Analysis | of the | Natural Classifications | of | Mammalia, | for the use of | Students and travellers. | By T. Edward Bowdich, Esq. | Conductor of the Mission to Ashantee, Member of the Wettervian Society of Natural History. | — | Paris, | Printed by J. Smith. | — | 1821. 8°. pp. i–iv, 5–115, pl. i–xv (osteology).

"The first part [pp. 5–89] of the text is a translation of almost all but the specific descriptions of the *Mammifères* of Cuvier's *Règne Animal*, . . . interwoven with additions from his Comparative Anatomy, Fossil Remains, the works of Frederic Cuvier, Dumeril, etc. . . . The second part contains a general outline of the system of Illiger. . . ." (p. iv).

Order VIII. *Cetacea*, pp. 84–89, 105, pl. xii, skulls of *Balæna boops* and *Physeter macrocephalus*; pl. xiii, fig. 3, skull of Dugong; pl. xiv, fig. 6, skull of American Manatee, fig. 7, do. of African Manatee. [597.]

1821. DELAVOIPIÈRE, —. Faits | relatifs | a la | Pêche de la Baleine, | Par Mr. Delavoipière, Capitaine français du Navire-Baleinier La Cérés, du Havre. | — | Au Havre, | Chez Stanislas Faure, Imprimeur du Roi. | — | 1821. 8°. pp. 1–30.

Différence qui existe entre les Baleines, et le moyen de les reconnaitre, p. 3. De la Baleine proprement dite, pp. 3, 4. De la Baleine à bosse, p. 4. De la Baleine à aileron, p. 5. Du Cachalot, p. 6. Parages et saison où se trouvent plus communément les poissons dont on extrait l'huile, pp. 6–8. Armement des piroques, pp. 8–10. De la poursuite, p. 11. De l'attaque, pp.

1821. **Delavoipière**—Continued.

12–15. De l'amarrage, p. 15. Observation à l'égard du Cachalot, p. 16. De l'amarrage à bord, pp. 16–19. Manière de découper la Baleine, p. 19. Disposition des caillornes et courans des garans, pp. 20–22. Manière de faire l'Huile,—Extraction du Sperme et des Fanons, pp. 22–26. Attaque de la Baleine dans les baies, pp. 26–28. Remarques sur la pêche, pp. 28–30. [598.]

1821. **Editors.** Analysis of a Journal of a Voyage for the Discovery, &c. of a North-West Passage from the Atlantic to the Pacific, in the years 1819–20. By Captain W. E. Parry, R. N., F. R. S. Lond. 1821, 4to., p. 479, with 20 Plates and Charts; and of A Journal of a Voyage of Discovery to the Arctic Regions. By Alexander Fisher, Surgeon, R. N. 8vo. pp. 320. <*Edinb. Philos. Journ.*, v, no. 9, art. xxviii, 1821, pp. 177–196.

A review of the works containing incidental references to Arctic Cetacea, including a description of musical sounds made by the Beluga (p. 181). *See* 1821. Fisher, A. [599.]

1821. **Editors.** Clay-slate Axe found in a Whale. <*Edinb. Philos. Journ.*, iv, no. 7, 1821, p. 216, pl. 3, fig. 11.

Apparently the head of an Esquimaux lance, cut out of the blubber of a Whale in Davis's Strait. [600.]

1821. **Fisher, A.** A | Journal | of a | Voyage of Discovery | to the | Arctic Regions, | in | His Majesty's ships | Hecla and Griper, | in the years 1819 & 1820. | — | By | Alexander Fisher, Surgeon R. N. | — | Fourth edition, corrected. | London: | Printed for | Longman, Hurst, Rees, Orme, and Brown, Paternoster-Row. 1821. 8°. pp. i–xi, 1–320, chart, map, and cuts.

Notices of *Cetacea* passim, to wit: *Balæna Physalus*, p. 23; *Balæna Mysticetus*, p. 31: *Beluga* or White Whale, pp. 72–74; *Monodon Monoceros*, pp. 74, 83–87 (cut, p. 84, external characters, and anatomical observations).

The "Journal", though rarely cited in zoölogical literature, is worthy of attention, containing many intelligent observations in natural history, and especially in reference to birds and Mammals. In regard to the latter, particularly important is the account of the Walrus (pp. 38–43, with a cut), which gives weight and detailed measurements of a specimen taken; also those of the Polar Bear (pp. 44–46, cut and measurements), and the Musk-Ox (pp. 249–253, 259, cut, measurements, external characters, and habits). [601.]

1821. **Home, E.** An account of the skeletons of the dugong, two-horned rhinoceros, and tapir of Sumatra, sent to England by Sir *Thomas Stamford Raffles*, Governor of Bencoolen. <*Philos. Trans. Lond.*, [cxi], pt. 2, art. xviii, pp. 268–275, pll. xx–xxiv.

Dugong, pp. 268–269; Pl. xx, skeleton of a female. [602.]

1821. **Jameson, William.** Narrative of a Voyage to Davis' Straits in 1820. <*Edinb. Philos. Journ.*, v, 1821, pp. 309–318.

A passing reference to *Delphinus leucas* (p. 312) and a short description of *Monodon monoceros* (p. 317). [603.]

1821. **Montagu, George.** Description of a Species of Delphinus which appears to be new. <*Mem. Wern. Soc. Nat. Hist.*, iii, 1821, pp. 75–82, 1 pl.

Description of *Delphinus truncatus*. Figures are given of the head and teeth. [604.]

1821. **Neill, Patrick,** *and* **[John] Barclay.** Account of a Belugia, or White Whale, killed in the Frith of Forth. <*Mem. Wern. Soc. Nat. Hist.*, iii, 1821, pp. 371–394, 2 pll.

Description, measurements, and anatomy. [Also separate.] [605.]

1821. **Raffles, T. S.** Descriptive Catalogue of a Zoological Collection, made on account of the Honourable East India Company, in the Island of Sumatra and its Vicinity, under the Direction of Sir Thomas Stamford Raffles, Lieutenant-Governor of Fort Marlborough; with additional Notices illustrative of the Natural History of those Countries. <*Trans. Linn. Soc. Lond.*, xiii, pt. 1, art. xvii, 1821, pp. 239–274.

On page 272 are five lines on "*Halicora Dugong.*" [606.]

1821. **Raffles, Thomas Stamford.** Some Account of the Dugong. <*Philos. Mag.*, lvii, 1821, pp. 341–346.

External characters and anatomy. [607.]

1821. **Raffles, Thomas [Stamford].** Einige Nachrichten über den Dugong. <*Froriep's Notizen aus dem Gebiete der Natur- und Heilkunde*, i, no. 8, Sept. 1821, pp. 113–117.

Aus den *Phil. Trans. Roy. Soc. Lond.* for 1820, pt. ii, pp. 174–182. [608.]

1821. **Rossily, —** *and* **Rossel, [E. P. E.].** Analysis of Mr. Scoresby's Account of the Arctic Regions, being a Translation of the Official Report of MM. Rossily and Rossel, to Baron Portal, Minister of the French Marine. <*Edinb. Philos. Journ.*, iv, no. 8, art. viii, 1821, pp. 285–294.

Includes remarks on the Whale-fishery of the Arctic Seas. [609.]

1822. **C., F. [Cuvier, F.]** Lamantin. <*Dict. des Sci. nat.*, xxv, 1822, pp. 169–173.

Le Lamantin d'Amérique (*Manatus americanus*), pp. 171, 172. Le Lamantin du Sénégal (*M. senegalensis*), p. 172. Lamantin (*foss.*), pp. 172, 173. [610.]

1822. **Demarest, A. G.** Mammalogie | ou | description des espèces de Mammèifres.—Premiere Partie, | contenant les ordres des Bimanes, des Quadrumanes et des Carnassiers. | Par M. A. G. Desmarest, | Professeur de Zoologie à l'École royale d'Economie rurale et vétérinaire d'Alfort; . . . [=additional titles, 3 lines]. | — | A Paris, | Chez M^{me} Veuve Agasse, Imprimeur-Libraire, rue des Poitevins, n^{o} 6. | — | 1820. | 4°. pp. i–viij, 1–276. | — | Seconde Partie, | contenant les ordres des Rongeurs, des Édentés, des Pachydermes, des Ruminans | et des Cétacés. | . . . A Paris, | . . . | — | 1822. 4°. pp. i–viij, 277–556 = Encyclopédie methodique, tome 182. 4°. 1820. (*See* 1789. **Bonnaterre.**)

Huitième Ordre. Cétacés, *Cetæ*, pp. 506–530. Première Famille, Cétacés herbivores. *Sirenia*, pp. 506–511. **1.** *Manatus americanus*, p. 507; **2.** *Manatus Senegalensis*, p. 508, **3.** *Halicore indicus*, p. 509; **4.** *Stellerus borealis*, p. 510.

Seconde Famille, Cétacés ordinaires, *Cete*, pp. 511–530. I^{re} Division, Cétacés a petite tête. **1.** *Delphinus* [*Delphinorhynchus*] *Geoffroyi* [= *D. Geoffrensis*, Blainv.], p. 512. **2.** *D.* [*Delphinorhynchus*] *coronatus*, p. 512. **3.** *D.* [*Delphinorhynchus*] *gangeticus*, p. 513. **4.** *D.* [*Delphinorhynchus*] *Perneltyi* [= *D. Pernettiensis*, Blainv.], p. 513. **5.** *D.* [*Delphinus*] *Boryi* ("espèce nouvelle"), p. 513. **6.** *D.* [*D.*] *delphis*, p. 514. **7.** *D.* [*D.*] *sinensis*, p. 514. **8.** *D.* [*D.*] *dubius* [= Dauphin douteux, Cuv.], p. 514. **9.** *D.* [*D.*] *tursio*, p. 514. **10.** *D.* [*D.*] *nesarnac*, p. 515. **11.** *D.* [*D.*] *niger* (Lacép.), p. 515. **12.** *D.* [*D.*] *rostratus*, p. 515. **13.** *D.* [*D.*] *orca*, p. 515. **14.** *D.* [*D.*] *feres*, p. 516. **15.** *D.* [*D.*] *canadensis* [= Dauphin blanc du Canada, Duhamel = *Beluga catodon*], p. 516. **16.** *D.* [*D.*] *Bertini* [= Dauphin de Bertin, Duhamel], p. 516. **17.** *D.* [*Oxypterus*] *Mongitori*, p. 516. **18.** *D.* [*Phocæna*] *phocæna*, p. 516. **19.** *D.* [*Ph.*] *Peronii*, p. 517. **20.** *D.* [*Ph.*] *Commersonii*, p. 517. **21.** *D.* [*Ph.*] *gladiator*, p. 517. **22.** *D.* [*Ph.*] *grampus*, p. 517. **23.** *D.* [*Ph.*] *griseus*, p. 518. **24.** *D.* [*Ph.*] *ventricosus*, p. 518. **25.** *D.* [*Ph.*] *globiceps*, p. 519. **26.** *D.* [*Ph.*] *Rissoanus* [= Dauphin de Risso, Cuv.], p. 520. **27.** *D.* [*Delphinapterus*] *leucas* [= *Beluga catodon*], p. 520. **28.** *D.* [*Heterodon*] *anarnacus*, p. 521. **29.** *D.* [*H.*] *Chemnitzianus* (= *Balæna rostrata*, Chemnitz) = *Hyperoodon butzkopf*, auct. recent.), p. 520. **30.** *D.* [*H.*] *Hunteri* [= *D. bidentatus*, Hunter], p. 521. **31.** *D.* [*H.*] *edentulus*, p. 521. **32.** *D.* [*H.*] *hyperoodon* [= *D. butskopf*, Bonnaterre], p. 521. **33.** *D.* [*H.*] *Sowerbyi* [= *D. Sowerbensis*], p. 521. **34.** *D.* [*H.*] *epiodon* [= *Epiodon urganantus*, Raf.], p. 521. **35.** *Monodon monoceros*, p. 523. **36.** *M. microcephalus*, p. 523. **37.** *M. andersonianus*, p. 523. **38.** *Physeter* [*Catodon*] *macrocephalus*, p. 524. **39.** *P.* [*C.*] *trumpo*, p. 524. **40.** *P.* [*C.*] *catodon* [Bonnat. = *Catodon svineval*, Lacép.], p. 525. **41.** *P.* [*Physalus*] *cylindricus*, p. 525. **42.** *P.* [*Physeter*] *microps*, p. 525. **43.** *P.* [*P.*] *orthodon*, p. 526. **44.** *P.* [*P.*] *mular*, p. 526. **45.** *P.* [*P.*] *sulcatus* (Lacép.), p. 526. **46.** *Balæna* [*Balæna*] *mysticetus*, p. 527. **47.** *B.* [*B.*] *glacialis*, p. 527. **48.** *B.* [*B.*] *nodosa*, p. 527. **49.** *B.* [*B.*] *gibbosa*, p. 528. **50.** *B.* [*B.*] *japonica* (Lacép.), p. 528. **51.** *B.* [*B.*] *lunulata* (Lacép.), p. 528. **52.** *B.* [*Balænoptera*] *gibbar*, p. 528. **53.** *B.* [*Balænop.*] *boops*, p. 528. **54.** *B.* [*Balænop.*] *musculus*, p. 529. **55.** *B.* [*Balænop.*] *rostrata*, p. 529. **56.** *B.* [*Balænop.*] *punctata* (Lacép.), p. 529. **57.** *B.* [*Balænop.*] *nigra* (Lacép.), p. 529. **58.** *B.* [*Balænop.*] *cærulescens* (Lacép.), p. 529. **59.** *B.* [*Balænop.*] *maculata* (Lacép.), p. 530.

Delphinus Boryi (p. 513), *D. dubius* (p. 514), *D. Bertini* (p. 516), *D. canadensis* (p. 516), *D. Rissoanus* (p. 519), spp. nn., *D. Hunteri* (p. 520), *D. hyperoodon* (p. 521), *D. epiodon*, nomm. nn.

"Le tableau de l'ordre des cétacés que nous allons tracer, est particulièrement destiné à faire connoitre les progrès de l'histoire naturelle de ces animaux, depuis l'époque où Bonnaterre (1789) a publié sa description des planches de *Cétologie*. Nous ne ferons qu'indiquer très-sommairement les espèces dont il a rapporté les caractères, en renvoyant à son texte et en indiquant ses figures. En un mot, le travail de Bonnaterre ne doit pas être considéré comme un double emploi du nôtre; mais celui-ci doit l'être, au contraire, comme son complément" (p. 506, note 1).

1822. DEMAREST, A. G.—Continued.

The plan here unfolded the author carried out in detail, every species added since the date of Bonnaterre's work being apparently included, regardless of its merits. Although many new specific names were introduced, only one species (*Delphinus boryi*) was given as "espèce nouvelle." Few of those described by Bonnaterre are here redescribed, or only briefly so, the author adding: "DESCRIP. *Voyez* la *Cétologie* de Bonnaterre, *loc. cit.*," to which work reference is always duly made. [611.]

1822. DESMOULINS, A. Cachalot. <*Dict. class. d'Hist. nat.*, ii, 1822, pp. 615–619.

Cachalot, *Physeter:* generalities, pp. 615–617; species, pp. 617–619. **1.** *Physeter* [*Catodon* Lacép.] *macrocephalus*, Shaw, p. 617; **2.** *Catodon macrocephalus*, var. B. Bonn. (=*Physeter gibbosus*, Schreb., pl. 338), p. 618; **3.** *Ph. catodon*, L., p. 618; **4.** *Ph. australianus*, Quoy, p. 818; **5.** *Ph.* [*Physeter*] *microps*, Schreb., pl. 339, p. 618; **6.** *Ph. Tursio* ou *mular*, p. 619; **7.** *Ph. sulcatus*, Lacép., p. 619.—The Cachalot's are divided into two groups or genera, as above.—*Catodon*, spp. 1, 2, and *Physeter*, spp. 3–7. The article is an indiscriminate compilation. [612.]

1822. EDITORS. Extracts from Dr. Hibbert's Description of the Shetland Islands. <*Edinb. Philos. Journ.*, vi, no. 11, art. vii, 1822, pp. 240–255.

Account of the pursuit and capture of a drove of Whales [*Globiocephalus melas*], pp. 240–243. [613.]

1822. HOME, EVERARD. Ueber die Eigenthümlichkeiten, wodurch sich de Manati der Westindischen Meere von dem Dugong der Ostindischen unterscheidet. <*Froriep's Notizen*, ii, Jun. 1822, pp. 260, 261.

Aus den *Phil. Trans. Roy. Soc. Lond.* [614.]

1822. MANBY, G. W. Journal | of a | Voyage to Greenland, | in the year 1821. | — | With graphic illustrations. | By George William Manby, Esq. | — | London: | Printed for G. and W. B. Whittaker, | 13, Ave-Maria Lane. | 1822. 4°. pp. vii, 143, maps, pll., and woodcc.

Remarks upon the Failure which has for some years attended the Whale-Fishery; with Considerations for removing the Obstacles which have occasioned the same. Appendix, pp. 123–143, numerous cuts of gun-harpoons and other harpoons, etc. Account of the common Greenland Whale (*Balæna Mysticetus*) and "of the early state of the fishing," pp. 29–37, with cuts. Also allusions to whaling and to the habits of various Cetaceans *passim*. Plate facing p. 60, "A boat going on the tail of a Whale"; plate facing p. 61, "A Whale upsetting a boat"; plate facing p. 81, "Lancing the Whale."

A German translation was published at Leipzig in 1823, and a Dutch version at Amsterdam in 1825. [615.]

1822. MOURT, —. Mourt's Relation. <*Coll. Mass. Hist. Soc.*, 2d ser., ix, 1822, pp. 26, 73.

Cape Cod "a place of good fishing; for we saw daily great whales of the best kind for oil and bone come close aboard our ship, and in fair weather swim and play about us; . . ." p. 36. This relates to the first visit of the Puritans to Massachusetts Bay in 1620. [616.]

1822. PRESIDENT AND COUNCIL OF NEW ENGLAND. A brief Relation of the discovery and plantation of New England: . . . <*Coll. Mass. Hist. Soc.*, 2d ser., ix, 1822, pp. 1–25.

Originally published in London, 1622.

"Ambergris, [and] great numbers of whales along the coast," p. 20. [617.]

1822. [RICCIO, ANTONIO, *et autres*]. Les Pêcheurs | étrangers, | domicilies et stationnés | à Marseille, | a MM. les Députés des Départemens. 8°. l. 1, pp. 16.

Le brochure est signée par Antonio Riccio, Joseph Vila et cinque autres, Billard, Avocat. Marseille, le 6 Août 1822. [618.]

1822. RUDOLPHI, D. K. A. Einige anatomische Bemerkungen über Balaena rostrata. <*Abhandl. d. phys. Kl. d. K.-P. Akad. d. Wissensch. zu Berlin*, 1820–1821 (1822), pp. 27–40, pll. i–v.

Pl. i, Skelet, pll. ii–iv, Schädel, pl. v, Kehlkopf, Rippe, Schwanzwirbelbein, u. s. w. [619.]

1822. WHATTON, W. R. [Note respecting the capture of a female *Monodon monoceros* in the North Seas in 1821.] <*Trans. Linn. Soc. Lond.*, xiii, pt. 2, 1822, p. 620. [620.]

1823. BAER, K. E. VON. De | Fossilibus Mammalium Reliquiis | in | Prussia | adjacentibusque regionibus | repertis. | — | Dissertatio, | quam | ad Professoris ordinarii munus | in Academia Albertina | rite capessendum | scripsit | Carolus Ernestus a Baer | . . . [=titles, 4 lines]. | — | Cum icone. | — | Regiomonti 1823. | In Libraria Academica. sm. 4°. l. 1, pp. 1–38, l. 1, pl.

§ 8. Cetorum reliquiae fossiles, pp. 34, 35. [621.]

R, G. Recherches | sur les | Ossemens fossiles, | où l'on rétablit | les
ctères de plusieurs animaux | dont les révolutions du Globe détruit les
ces; | Par M. le B^on^. G. Cuvier, | . . . [= titles, 5 lines.] | Nouvelle Édi-
, | entièrement refondue, et considérablement augmentée. | — | Triom-
nte des eaux, du trépas et du temps, | La terre a cru revoir ses premiers
itants. | Delille. | — | Tome cinquième, I^re^. partie, | contenant les rougeurs,
tentés, et les mammifères marins. | Paris, | Chez G. Dufour et E. d'Ocagne,
aires, | Quai Voltaire, N°. 13. | Et a Amsterdam, chez les mêmes. | 1823.
ll. 2, pp. 1–405, pll. i–xxvii.

apitre II. Des Lamantins et des genres qui appartiennent a la même famille, pp. 235–
pll. xix, xx. Première Section. Des Espèces vivantes et de leur Ostéologie, pp. 235–265,
cle première. Du lamantin d'Amerique et de son ostéologie, pp. 242–253. Article II. Des
ces nominales du petit lamantin des Antilles et du lamantin des Grandes-Indes, p. 254.
cle III. Du lamantin du Sénégal, pp. 254–256. Article IV. Du prétendu lamantin du
de Steller, pp. 256–259. Article V. Du dugong, pp. 259–265.
ction II. Ossemens fossiles de Lamantins pp., 266–271.
. xix, Lamantins et Dugong. Pl. xx, Ostéologie du Dugong. Lamantin d'Amérique, pl.
fig. 1, squelette; figg. 2, 3, crâne; figg. 8–10, l'os de l'oreille; fig. 11, une de ces dents;
14–16, avant-bras; figg. 17, 18, humérus. Lamantin du Sénégal, pl. xix, figg. 4, 5, crâne.
ong, pl. xix, figg. 6, 7, crâne; pl. xx, fig. 1, squelette; figg. 2–4, crâne; figg. 5, 6, humérus;
9–11, avant-bras; figg. 12–14, l'os de l'oreille; fig. 15, atlas. Lamantin fossile, pl. xix, fig.
ertèbre; figg. 22, 23, partie supérieure du crâne; figg. 19–21, avant-bras. Pl. xix contenant
ie (figg. 24–28) os fossiles des phoques.

hapitre II is a reprint of the same author's memoir entitled "Sur l'Ostéologie du Lamantin,"
published originally in tome xiii (1809) of the *Annales du Muséum d'Histoire naturelle*,
273–312) with the omission of Article vii, and the addition of new matter (the additions
rring at pp. 244–248, 261–265, 270, 271, with alterations at p. 266, of the *Ossemens fossiles*.)
x is also added, but pl. xix is the same as pl. xix of the *Annales*, *l. c.*]

apitre III. Des Ossemens de Dauphins, pp. 273–318. Première section. Des Dauphins
ns, pp. 273–308. Article premier. Détermination des espèces de dauphins. § 1. Les dau-
s à bec, pp. 275–280. § 2. Les dauphins à tête obtuse, pp. 280–287. § 3. Les dauphins sans
ale ou delphinaptères de M. de Lacépède, pp. 387–389. Article II. Ostéologie comparative
lifférentes espèces. § 1. Tête de dauphins, pp. 290–302 [remarques générales, pp. 290–295;
hinus delphis ou le dauphin vulgaire, p. 295, pl. xxi, figg. 9, 10, crâne; Le *Delphinaptère à
eau blanc* ou dauphin de Péron, p. 295, pl. xxi, figg. 5, 6, crâne. Le *frontatus*, p. 296, pl.
figg. 7, 8, crâne, pl. xxiii, figg. 6–8, coupes transversales du museau. Le *tursio*, p. 296, pl.
figg. 3, 4, crâne. Le *marsouin*, p. 296, pl. xxi, figg. 1, 2, crâne. Le *griseus*, p. 297, pl. xxiii,
1, 2, crâne. Le *grampus* ou épaulard, p. 297, pl. xxii, figg. 3, 4, crâne. Le *globiceps*, p. 297,
xi, figg. 11–13, crâne. Le *beluga* (*D. leucas*), p. 297, pl. xxii, figg. 5, 6, crâne. Le dauphin
Gange, pp. 298–300, pl. xxii, figg. 8–10, crâne. Principales dimensions des diverses têtes de
phins, p. 302.] § 2. Du reste du squelette des dauphins, pp. 303–308. [Le *Dauphin vulgaire*,
03–305, pl. xxiii, fig. 23, atlas, fig. 25, quatrième cervicale, fig. 26, huitième cervicale, fig. 27,
ième lombaire, fig. 28, neuvième lombaire, fig. 29, quatrième caudale, fig. 18, omoplate, fig.
umérus. Le *tursio*, p. 305, pl. xxiii, fig. 17, omoplate. Le *globiceps*, p. 305, pl. xxiii, fig. 16,
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ion II. Des Dauphins fossiles. Article premier. D'un dauphin voisin de *l'épaulard* et du
ceps, dont le squelette a été déterré en Lombardie, pp. 309–312, pl. xxiii, fig. 1, squelette,
, tête en dessous, fig. 3, sternum, fig. 15, os styloïdien. Article II. D'un dauphin à longue
physe de la mâchoire inférieure, déterré dans une falunière du département des Landes,
12–315, pl. xxiii, figg. 4, 5, mâchoire; figg. 9–11, un fragment du même. Article III. D'un
phin fort voisin de l'espèce commune, trouvé également dans les falunières du département
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vée dans calcaire grossier du département de l'Orne, pp. 317, 318, pl. xxiii, fig. 38.

hapitre IV. Des Ossemens de Narwals, d'Hyperoodon et de Cachalots, pp. 319–357. Pre-
re Section. Des Espèces vivantes, pp. 319–348. Article premier. Des Narwals. § 1. De-
ption de l'animal, pp. 319–322. § 2. Ostéologie, pp. 322, 323, pl. xxii, fig. 7, crâne. Article II.
l'Hyperoodon. § 1. Caractères extérieurs, pp. 324–326. § 2. Ostéologie, pp. 326–328, pl.
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lation des caractères indiqués pour leurs espèces; incertitude de ces caractères [histori-
et critique], pp. 328–342. § 2. Ostéologie des Cachalots. 1°. De la Tête, pp. 342–346, pl.
, figg. 1–5, crâne. 2°. Du reste du squelette, pp. 346–348, pl. xxiv, fig. 13, atlas, fig. 12, les
autres vertèbres cervicales, fig. 15, la deuxième dorsale, fig. 16, la neuvième dorsale, fig. 17, la

1823. Cuvier, G.—Continued.

troisième lombaire, fig. 18, quatrième lombaire, fig. 11, omoplate; fig. 14, humérus et avant-bras, figg. 6–10, mâchoire inférieure, exemplaires différens. Section II. Des Ossemens fossiles de Narwals et de Cétacés voisins des Hyperoodons et des Cachalots, pp. 349–357. Article premier. Fragmens fossiles de Narval, pp. 349, 350. Article II. Sur une tête pétrifiée de Cétacé d'un genre inconnu, voisin des cachalots et des hyperoodons, trouvée sur la côte de Provence, pp. 350–352, pl. xxvii, fig. 3, crâne. [Cette espèce est nommé *Ziphius cavirostris.*] Article III. Sur des têtes du genre caractérisé dans l'article précédent, complétement pétrifiées, déterrées en creusant les bassins d'Anvers, pp. 352–356, pl. xxvii, figg. 4–6, crâne. [Cette espèce est nommée *Ziphius planirostris.*] Article IV. D'un morceau qui indique une espèce voisine des précédentes, mais à museau plus allongé, pp. 356–357, pl. xxvii, figg. 9, 10, partie du rostre. [Cette espèce est nommée *Ziphius longirostris.*]

Chapitre V. Des Ossemens de Baleines, pp. 359–396. Première Section. Des Espèces vivantes, pp. 359–388. Article premier. Détermination des espèces, pp. 360–370 [historique et critique]. Article II. Ostéologie. § 1. De la tête, pp. 370–377, pl. xxvi, figg. 1–4, crâne de rorqual du Cap; fig. 5, crâne de rorqual de la Méditerranée; fig. 6, crâne de rorqual de la mer du Nord; pl. xxv, figg. 1–4, crâne d'une baleine proprement dite d'après un jeune individu du Cap; figg. 5–8, d'après un adulte de la même espèce; figg. 9–11, d'après un adulte du Groënland; pl. xxvii, figg. 10–15, os de l'oreille d'après l'espèce du Cap. § 2. Du reste du squelette. 1°. Dans les baleines proprement dites, pp. 378–381, pl. xxvi, fig. 13, vertèbres cervicales, fig. 14, quartrième dorsale, fig. 15, onzième dorsale, fig. 16, première lombaire, fig. 17, une des premières caudales, fig. 11, sternum, fig. 7, omoplate, fig. 23, humérus, avant-bras et manus—toutes les figures d'après la grande baleine du Cap; fig. 18, vertèbres cervicales d'après une autre espèce, fig. 8, omoplate, d'après de baleine franche. 2°. Dans les rorquals, pp. 381–385, pl. xxvi, fig. 19, atlas, fig. 21, quatrième cervicale, fig. 9, omoplate, fig. 22, humérus et os de nageoire, toutes les figures d'après le rorqual du Cap; [quelques observations sur l'os du bassin et sur l'os hyoïde des cétacés], pp. 385–388, pl. xxvi, fig. 24, os du bassin d'après le rorqual, fig. 25, os du bassin d'après la grande baleine, pl. xxv, fig. 12, os hyoïde d'après les dauphins, fig. 14, os hyoïde d'après la grande baleine du Cap, fig. 15, os hyoïde d'après le cachalot d'Audierne(!). Section II. Des Baleines fossiles, pp. 389–396. Article premier. D'une baleine du sous-genre des rorquals, dont il a été déterré deux squelettes en Lombardie, pp. 390–392, pl. xxvii, fig. 1, squelette, copiée de M. Cortesi. Article II. D'un fragment considérable de tête de Baleine déterré dans le sein de la ville de Paris, pp. 393–396, pl. xxvii, fig. 16.

Résumé de cette septième partie, pp. 397–399. Addition importante à cette septième partie [relative au *Delphinus frontatus*, nommé à p. 278], p. 400.

Delphinus frontatus, pp. 278, 296, 400, *D. griseus*, p. 284, note 1, p. 297, spp. nn.; *Ziphius cavirostris*, p. 352, *Z. planirostris*, p. 356, *Z. longirostris*, p. 357, gen. et spp. nn.

Cuvier, in his classic memoir on the recent and fossil Cetacea, thoroughly sifted the literature of the subject, critically separating, for the first time, the few grains of wheat from the vast amount of chaff that had already accumulated, placing the subject on a solid basis, besides adding, in both his plates and text, a large amount of new and well-considered information respecting the osteology of the species. In his historical résumé, no less than in the technical portions of the work, is seen the hand of the master. Unfortunately, however, for the nomenclature of the subject, the species are largely treated under simply vernacular names, but they may be easily identified with their proper systematic cognomens. A single new genus (*Ziphius*) with three new species, and two or three new species referred to *Delphinus*, are for the first time defined, while the untenability of various nominal species is clearly shown. In some instances, however, he appears to have overstepped the bounds of judicious criticism, but not to the extent claimed by Dr. J. E. Gray, who says that Cuvier, in examining previous authorities, approached "the work with a predisposition to reduce the number of species, which his predecessors had described, to the smallest number . . . To make this reduction: first, he believes that the Hump-backed Whale, of Dudley, is only a whale that has lost its fin, not recognizing that the *Cape Rorqual*, which he afterwards described from the fine skeleton now shown in the inner court of the Paris Museum, is one of this kind; secondly, that the Black-fish [*Physeter Tursio*, Gray], and the Sperm Whale are the same species; an error which must have arisen from his not having observed that Sibbald had figured the former, for he accuses Sibbald of twice describing the Sperm Whale; and when he came to Schreiber's [*sic*] copy of Sibbald's figure, he thinks the figure represents a Dolphin which had lost its upper teeth, overlooking the peculiar form and posterior position of the dorsal fin, and the shape of the head, which is unlike that of any known Dolphin. This mistake is important, as it vitiates the greater part of Cuvier's criticism on the writings of Sibbald, Artedi, and others, on these animals."—(*Cat. Mam. Brit. Mus.*, pt. i, *Cetacea*, 1850, 3. *Cf.* also Gray, *l. c.*, p. 54.)

Gray's criticism, however, lacks the support of the best modern Cetologists, who discard Gray's *Physeter Tursio*, based on Sibbald as above, and still known only from Sibbald's figure and description, and the grotesque figure of Bayer's *Mular*. He for the first time reduced the Cachalots to a single species,—a conclusion amply sustained by later investigators. [622.]

OULINS, ANTOINE. Cétacés. <*Dict. class. d'Hist. nat.*, iii (Cad–Chè),
3, pp. 411–417.

eneral account of the order, according to the classification of G. Cuvier (*Règne Animal*,
c i). Contains a correction of the article Baleine (*op. cit.*, t. ii, p. 165), and adds the fol-
.ug, previously described (*Mém. du Muséum*, t. iv) by Lacépède from Japanese paint-
: **14.** *Balanoptera punctata*; **15.** *Bal. nigra*; **16.** *Bal. cærulescens*; **17.** *Bal. macu-*
, p. 417. [623.]

:RT, FRZ. Das Thierreich. Eine belehrende Darstell. der bekannten leben-
ı Geschöpfe der Erde. 4 Thle. Mit 8 Kpfrtaf. 8°. Wien, 1823."

ʼot seen; title from Carus and Engelmann. [624.]

ORS. [Vertebra of a Whale found near Dingwell.] <*Edinb. Philos. Journ.*,
no. 17, art. xxii, 1823, p. 185.

Notice (10 lines) in a report of the Proceedings of the Royal Society of Edinburgh for March
1823. [625.]

MING, JOHN. Gleanings of Natural History, gathered on the Coast of Scot-
ıd during a voyage in 1821. <*Edinb. Philos. Journ.*, viii, no. 16, art. x, 1823,
. 294–303.

Mentions seeing *Balænoptera rostrata*, p. 303. [626.]

IE, EVERARD. Lectures | on | Comparative Anatomy; | in which are ex-
ained | the Preparations | in | the Hunterian Collection. | — | Illustrated
ʼ Engravings. | — | To which is subjoined, | Synopsis Systematis Regni
nimalis, | nunc primum ex ovi modificationibus propositi. | — | By Sir Eve-
ırd Home, Bart. | V. P. R. S. F. S. A. F. L. S. | . . . [=titles, 8 lines]. | — | In
our Volumes. | Vol. III [-IV]. | London: | Printed for Longman, Hurst, Rees,
rme, and Brown, | Paternoster-Row. | 1823. 4°. Vol. iii, text, l. 1, pp. i-
vii, l. 1, pp. 1–586; vol. iv, plates, pp. i–viii, l. 1, pll. i–clxxi, each with an
xplanatory leaf.

The whole work consists of 6 vols., 3 of text and 3 of plates, published as
ollows: vol. i, ii, 1814; vols. iii, iv, 1823; vols. v, vi, 1828.

Cetacea and Sirenia, *passim*, in lectures Fifth, Sixth, Seventh, Ninth, and Tenth. The fol-
owing is a list of the plates relating to these groups:

Pl. xvii, jaws of *Delphinus gangeticus*; pll. xxi–xxiii, skull and teeth of Dugong; pll. xxiv,
:xv, tongue, stomach, and cæcum of Dugong; pl. xxvi, stomach of Manatee; pl. xxvii, cæcum
f Manatee; pl. l, heart of Dugong; pl. li, portion of trachea and section of lungs of Dugong;
pl. lii, Dugong (animal); pl. liii, sternum and pelvis; pl. liv, skeleton of Dugong; pl. lv,
Manatee (animal); pl. lvi, skeleton of Manatee; pl. c, ear bone of *Balæna mysticetus*, external
view; pl. ci, do., internal view; pl. cxvi, uterus and penis of Dugong.

The plates here noted all first appeared in the *Phil. Trans. Roy. Soc. London*. *See* HOME,
E., at 1818, 1820, and 1821. [627.]

NKAIRE, M. DE LA. Notice géologique sur les environs d'Anvers. <*Mém. de
a Soc. d'Hist. Nat. de Paris*, i, 1823, pp. 110–126.

Ossemens de Cétacés, p. 117. [628.]

MANBY, G. W. Journal | of a | Voyage to Greenland, | in the year 1821. | With graphic illustrations. | — | By George William Manby, Esq. | — | The Second Edition. | London: | Printed for G. and W. B. Whittaker, | Ave-Maria Lane. | — | MDCCCXXIII. 1 vol. 8vo. pp. xi, 225, maps, pll., and woodcc."

A reprint in 8° of the 4° edition of 1822. Not seen; title from Coues, *Bds. Col. Vall.*, p. 606. For notice of cetological matter see *suprà*, 4° ed., 1822. [629.]

CORESBY, WILLIAM, *jr*. Journal | of a Voyage to the | Northern Whale-fishery; | including | researches and discoveries on the Eastern Coast | of | Greenland, | made in the Summer of 1822, in the ship | Baffin of Liverpool. | By | William Scoresby, *Junior*, | F. R. S. E., M. W. S. &c. &c. | commander. | — | Edinburgh: | Printed for Archibald Constable and Co. Edinburgh: | and Hurst, Robinson and Co. Cheapside, London. | — | 1823. 8°. pp. i–xliii, pp. 1–472, pl. i–viii.

List of Animals met with on the Eastern Coast of Greenland, with Notes and Memoranda. I, Mammalia, pp. 416–420. *Cetacea*, **1.** *Balæna Mysticetus*, **2.** *B. gibbar*, **3.** *Monodon Monoceros*, p. 420.

1823. SCORESBY, WILLIAM, *jr.*—Continued.

Whalefishery and Whales, *passim*, in text, to wit: A Whale captured, p. 41; Narwhals, pp. 75, 76; capture of Whales, pp. 123–130, 134–136; Narwhal taken,—description of the animal, including measurements, p. 132; further account of the Narwhal, including its anatomy, pp. 136–142, figg. at pp. 140, 141, illustrative of structure of blow-hole; anatomy of the Whale, pp. 148–158, figg. showing structure of blow-holes at pp. 152, 153; Whales taken, pp. 285–290. [630.]

1824. ANON. Udtog af en Dagbog, holdet paa en Rejse i Grönland i Sommeren 1823. <*Örsted, Tidsskrift for Naturvidenskaberne*, 1824, no. 9, pp. 271–289, no. 10, pp. 1–35.

References *passim* to various Cetaceans, *e. g.*, no. 10, pp. 2, 4, 20, 26, 29, etc. [631.]

1824. ANON. A Voyage to Cochin China. By John White, Lieutenant in the United States Navy. <*Edinb. Rev.*, xli, 1825, pp. 123–142.

An extended review of the work (*see* 1824. WHITE, J.), containing, at pp. 136–142, some account of the Southern Whale Fishery. [632.]

1824. CHAMISSO, ADELBERTUS DE. Cetaceorum maris Kamtschatici imagines, ab Aleutis e ligno fictas, adumbravit recensuitque Adelbertus de Chamisso, Dr. <*Nov. Act. Phys.-med. Acad. Cæs. Leop.-Carol. Nat. Curios.*, xii, 1, 1824, pp. 249–260, pll. xvi–xx; xii, 2, p. 873 (corrigenda).

1. *Balaena Kuliomoch*, pp. 249–256, pl. xvi, fig. 1 (*i. e.*, pl. xvii, fig. 3). **2.** *Balaena Abugulich*, pp. 256, 257, pl. xvi, fig. 2 (*i. e.*, pl. xvii, fig. 1). **3.** *Balaena Mangidach*, p. 257, pl. xvii, fig. 3 (*i. e.*, pl. xvi, fig. 1). **4.** *Balaena Agamachtschich*, pp. 257, 258, pl. xviii, fig. 4. **5.** *Balaena Aliomoch* vel *Aliama*, p. 256, pl. xviii, fig. 5. **6.** *Balaena Tschickagluk*, p. 257, pl. xix, fig. 6. **7.** *Physeter Agidagich* vel *Agdagjach*, pp. 257, "260" (*i. e.*, 258), pl. xix, fig. 7. **8.** *Ancylodon? Alugninich*, pp. "261, 262," pl. xx, fig. 8. **9.** *Delpinus* [*sic*] *Aguluch*, p. 260, pl. xx, fig. 9.

A more barbarous piece of work was doubtless never perpetrated in natural history than the burdening of Cetology by Chamisso with nine "species" of Cetaceans based on wooden images made by the Aleuts. In the light of present knowledge of the Cetacea of the Japan seas most of them may be determined generically, mainly, however, on the basis of exclusion. The delineations and descriptions are of interest as showing the proficiency of savages in carving natural objects in wood, but as diagnoses of actual species they are not entitled to recognition, and the barbarous names by which they are specifically designated may well drop from the system as indeterminable synonyms. A page of errata in the second part of the volume shows that the references in the text to the first three figures are erroneous, while, to further complicate the citation of the paper, pp. 256 and 257 and p. 260 are duplicated, while there are no pp. 258 and 259.

Balaena Kuliomoch (fig. iii, not fig. i, as given in the text) relates quite evidently to some species of *Balæna*. *Balæna Abugulich* (fig. i, not fig. ii, as given in the text), *Balæna Mangidach* (fig. ii, not fig. iii, as given in the text), and *Balæna Agamachtschich* (fig. iv), all apparently relate to Fin-Whales. The size of the pectoral fin in *Balæna Aliomoch* (fig. v) seems to indicate that it is a species of *Megaptera*. *Balæna Tschikagluck* (fig. vi) is unrecognizable even generically; it may, however, relate to *Rhachianectes*. *Physeter Agidagich* (fig. vii) has a general resemblance only to *Physeter*. The *Ancylodon? Alugninich* (fig. viii) is unrecognizable. *Delp*[*h*]*inus Aguluch* (fig. ix) is apparently some species of Orca. [633.]

1824. CUVIER, G. Sur la détermination des diverses espèces de Baleines vivantes. <*Ann. des Sci. nat.*, ii, 1824, pp. 27–41.

Extrait de *Recherches sur les Ossemens Fossiles*, v, pp. 360–370. [634.]

1824. DESM[ARE]ST, [A. G.] Revue et representation d'images sculptées en bois par les habitans des îles Aléoutes, représentant diverses espèces de Cétacés des mers du Kamtschatka; par A. de Chamisso; av. 5 pl. litogr. (*Nov. Acta Acad. Cæs. Leop. Carol. Nat. Cur.*, to. xii, 1re partie). <*Férussac's Bull. des Sci. nat.*, iii, 1824, pp. 70–75.

Résumé. [635.]

1824. DESMOULINS, A. Dauphin. <*Dict. class. d'Hist. nat.*, v, Cra–D, 1824, pp. 348–361.

Dauphin, *Delphinus*: generalities, pp. 348–353; species, pp. 353–361. **1.** *Delphinus Delphis*, L., p. 363; **2.** *D. Tursio*, Fabr., p. 354; **3.** *D. frontatus*, Cuv., p. 354; **4.** *D. Bredanensis*, Cuv., p. 355; **5.** *D. coronatus*, Frém., p. 355; **6.** *D. gangeticus*, Lebeck, p. 355; **7.** *D. dubius*, Cuv., p. 356; **8.** *D. Boryi*, Desm., p. 356, pl. cxli, fig. 1 (original); **9.** *D. Phocæna*, L., p. 557 (*i. e.*, 357); **10.** *D. Orca*, Fabr., p. 557 (*i. e.*, 357); **11.** *D. griseus*, Cuv., p. 557 (*i. e.*, 357); **12.** *D. globiceps*, Cuv., p. 358; **13.** *D. Leucas*, Pall., p. 358; **14.** *D. Peronii*, Lacép. (= *D. leucorhamphus*, Péron), p. 359; **15.** Dauphin Rhinocéros, Quoy et Gaim., p. 359; **16.** Dauphin

MOULINS, A.—Continued.
acigère, Quoy et Gaim., p. 359; **17.** Dauphin albigère, Quoy et Gaim., p. 360; **18.** Dauphin Cortési, Cuv. (foss.), p. 360; **19.** Dauphin à longue symphise, Cuv. (foss.), p. 360; **20.** ot named], foss., p. 361; **21.** [not named], foss., p. 361.

The genus Delphinus is divided into three sections, to wit, "† Dauphins à bec," including p. 1–8; "†† Dauphins à tête obtuse," spp. 8–12; "††† Dauphins sans dorsale, Delphinap-res de Lacépède," spp. 13, 14. Numbers 15–17 (I–III in the original) are entered *incertæ cedis*, tween spp. 14 and 15 of the original article; and then follow "Dauphins fossiles," spp. 18–21 5–18 in the original). [636.]

MOULINS, A. Dugong, Trichechus Dugong, Gmel. <*Dict. class. d'Hist. nat.*, Cra–D, 1824, pp. 640, 641, pl. cxli, fig. 2. [637.]

? DESMOULINS, A.] De l'existence du nerf olfactif ou ethmoïdal dans les Ba-ines; par A. Desmoulins. (*Dict. class. d'Hist. nat.*, t. 2, art. *Baleine.*) <*Férus-c's Bull. des Sci. nat.*, ii, 1824, pp. 362, 363. [638.]

TORS. Habits of the Whale. <*Edinb. Philos. Journ.*, xi, no. 21, 1824, pp. 0, 221.
Note on the occurrence of a Whale in the St. Lawrence River, near Montreal. [639.]

TORS. Notice in regard to a Fossil Whale discovered in Dunmore Park. *Edinb. Phil. Journ.*, xi, no. 21, 1824, p. 220.
Its position similar to that of Airthrie; estimated length, "70 or 75 feet." (See *infrà*, 1824. EDDOCH.) [640.]

IWALD, E. Observationes nonnullæ circa fabricam Delphini Phocænae aeta-s nondum provectae. <*Mém. de l'Acad. imp. des Sci. de St.-Pétersbourg*, v° r., ix, 1824, pp. 431–452. [641.]

ER, [FRIEDRICH]. Udtog af en Skrivelse fra Regiments-qvarteermester og uditeur Faber til Prof. Reinhardt, dateret Horsens d. 28 Juli 1824. <*Örsted, idsskrift for Naturvidenskaberne*, iv, no. 10, 1824, pp. 110–118.
A slight reference to *Balæna Boops* at p. 110. [642.]

LAN, RICHARD. On a species of Lamantin resembling the Manatus Senega-nsis (Cuvier) inhabiting the Coast of East Florida. <*Journ. Acad. Nat. Sci. hila.*, iii, 1824, pp. 390, 394, pl. xiii, figg. 1–3.
Manatus latirostris, sp. n., based on "two skulls, two ribs, and a strip of skin, seven feet x inches in length, half an inch thick." Skulls described in detail, with figures (pl. xiii, gg. 1–3), and compared with skulls of *M. americanus* (pl. xiii, fig. 5) and *M. senegalensis* l. xiii, fig. 4). No characters are found in the skull to separate *M. latirostris* from *M. negalensis*, but the name *latirostris* is proposed for adoption in case further investigation ould reveal external differences sufficient to separate the Florida Manatee from the frican! [643.]

RAUSGEBER. Rudolphi; anatomische Bemerkungen über *Balaena rostrata.* *Isis von Oken*, xiv, 1824, pp. 620, 621.
Auszug aus *Abhandl. d. phys. Classe d. k. p. Acad. d. Wissen. zu Berlin*, 1820–1821 (1822), p. 27–40. [644.]

RAUSGEBER. Über die Strecken, welche die Walfische durchschwimmen. <*Froriep's Notizen aus dem Gebiete der Natur- und Heilkunde*, viii, no. 8, Sept., 824, pp. 121, 122.
Abstract aus Hr. Baron vom Zach's *Correspondence astronomique, géographique, hydro-raphique et statistique*, ix, no. 1, 1823, p. 95. [645.]

DDOCH, —. Further particulars in regard to the Fossil Whale of Dunmore. <*Edinb. Philos. Journ.*, xi, no. 22, 1824, pp. 415–417.
A letter supplementing an editorial communication in the preceding number, giving a de-ailed account of the situation of the skeleton. [646.]

OX, [ROBERT]. Anatomische Beobachtungen über die Milchgefäss im Seehund nd Wal, aus Briefen von Dr. Knox an Dr. Duncan. <*Froriep's Notizen aus em Gebiete der Natur- und Heilkunde*, viii, no. 4, August, 1824, pp. 49–53.
Uebersetzet aus *Edinburgh Med. and Surg. Journ.*, July, 1824, p. 23. [647.]

1824. **RAINE, THOMAS.** Notice in regard to Macquarie Island. <*Edinb. Philos. Journ.*, xi, no. 21, art. iii, 1824, pp. 46–50.

Reference (p. 49) to "the black or proper whale," and to the "fish called by whalers the Killer," which "is said to kill its prey by goring it in the belly with its dorsal fin, which is sharp, and sometimes from 8 to 10 feet long, shaped like a scythe." [648.]

1824. **SABINE, E.** A | Supplement | to | the Appendix of Captain Parry's Voyage for the | Discovery of a North-West Passage, | in the years 1819–20. | Containing | an account of the subjects | of | Natural History. | — | London; | John Murray, Albemarle-street. | — | MDCCCXXIV. 4°. ll. 5, pp. clxxxiii–cccx, pll. 6.

Mammalia, by Edward Sabine, pp. clxxxiii–cxcii.
Monodon monoceros, p. cxcii (short description of a specimen killed). [649.]

1824. **SCHLEEP, [B. C.]** Einige zoologische Bemerkungen. <*Isis von Oken*, xv, 1824, pp. 891–899.

Delphinus phocaena, p. 892. Die Schwanzflosse horizontal und nicht vertical war (!) wie Block und Bechstein gesagt haben. [650.]

1825. **BLAINVILLE, H. DE.** Note sur un cétacé échoué au Havre, et sur un ver trouvé dans sa graisse. <*Nouv. Bull. des Sci. de la Soc. philom. de Paris*, 1825, pp. 139–141.

Caractères externes, etc., d'un cétacé sans nom scientifique. [651.]

1825. **BLAINVILLE, H. DE.** Über ein bei Havre gestrandetes fischartiges Säugethier und einen in dem Speck desselben gefunden Wurm. <*Froriep's Notizen*, etc., xii, No. 256, Dec. 1825, pp. 212–214. [652.]

1825. **BLUMENBACH, J. F.** Handbuch | der | Naturgeschichte | von | Joh. Fried. Blumenbach. | [Vignette.] Eilfte rechtmässige Ausgabe. | — | Göttingen, 1825. | In der Dieterich'schen Buchhandlung. 8°. pp. i–xii, 1–668, pll. i, ii.

Trichechus manatus, p. 112. *Cetacea*, pp. 113–115. Genn. 4, spp. 7. Text substantially the same as in the 10th ed., 1821, *q. v.* [653.]

1825. **CUVIER, F.** Des | Dents des Mammifères, | considérées | comme caractères zoologiques. | Par M. F. Cuvier. | — | Le Cabinet d'anatomie formé par M. G. Cuvier, | au Jardin du Roi, pouvait seul donner l'idée et | fournir les matériaux de cet ouvrage. | [Monogram.] | F. G. Levrault, Éditeur, à Strasbourg, | et rue de la Harpe, N°. 81, à Paris. | Le Normant, rue de Seine, N°. 8, a Paris. | 1825. 8°. pp. i–lv, 1–258, l. 1, pll. i–ciii + iii *bis*, xi *bis*, xxii *bis*, xxxiv *bis*, lxxxvi *bis*, xci *bis*, xciii *bis* = cx.

Cétacés herbivores. pp. 236–239. Pl. xcvi, *Manatus americanus*; pl. xcvii, *Halicore dugong*. *Cétacés piscivores*, pp. 240–246, pll. xcviii–ciii. Pl. xcviii, *Delphinus* sp.; pl. xcix, *D. gangeticus*; pl. c, "Marsouins"; pl. ci, *Grampus* sp.; pl. cii, *Monodon monoceros*; pl. ciii, *Physeter macrocephalus*.

The descriptions are brief; there are no textual references to the plates, nor is there any exact indication of what species are figured. The work is of little importance in reference to Cetaceans. [654.]

1825. **CUVIER, G.** Recherches | sur les | Ossemens fossiles, | où l'on rétablit | les caractères de plusieurs animaux | dont les révolutions du Globe ont détruit les espèces; | Par M. le B^on^. G. Cuvier, | . . . [=titles, 5 lines]. | Troisième Édition. | — | Triomphante des eaux, du trépas et du temps, | La terre a cru revoir ses premiers habitants. | Delille. | — | Tome Premier [–Cinquième]. | [Seal.] Paris, | Chez G. Dufour et E. D'Ocagne, Libraires, Quai Voltaire, N°. 13. | Et a Amsterdam, chez les même. | 1825. 4°. ll. 2, pp. 1–405, pll. i–xxvii.

This is apparently a reissue of the "Nouvelle Édition," 1823, *q. v.*, from the same plates, with a new title-page, altered as above. [655.]

1825. **DESM[ARE]ST, A. G.** Sur une nouvelle espèce de Lamantin, qui ressemble au *Manatus senegalensis* de M. Cuvier, et habite les côtes de la Floride orientale; par M. R. Harlan. (*Journ. of the Acad. Nat. Sc. of Philadelph.*, vol. iii, no. 13, mai 1824.) <*Férussac's Bull. des Sci. nat.*, iv, 1825, pp. 106–108.

Résumé. [656.]

1825. Editors. Remains of a Fossil Whale brought from the Apennines, by Lord Glenorchy. <*Edinb. Philos. Journ.*, xiii, no. 26, 1825, p. 385. [657.]

1825. F. Lamantine. <*Edinb. Journ. Sci.*, ii, 1825, p. 186.

A brief abstract of Harlan's paper (*Journ. Acad. Nat. Sci., Philadelphia*, iii, pp. 390 *et seqq.*) on *Manatus latirostris*. (*See* 1824. Harlan, R.) [658.]

1825. Harlan, Richard. Fauna Americana: | being | a Description | of the | Mammiferous Animals | inhabiting North America. | — | By Richard Harlan, M. D. | . . . [= titles, 6 lines]. | — | . . . [= motto, 3 lines]. | — | Philadelphia: | published by Anthony Finley. | J. Harding, Printer. | 1825. 8°. pp. i–x, 11–320.

"Order *Ceta*" (pp. 274–301) includes: "1. Family *Cetacea Herbivora*, Sirenia" (pp. 274–281), and, "2. Family *Ceta*, or Whales proper" (pp. 281–301).

Sirenia: **1.** *Manatus latirostris*, p. 277; **2.** Fossil Manatus, p. 278; **3.** *Stellerus borealis*, p. 279.

Cetacea: **1.** *Delphinus* [*Delphynorhynchus*] *coronatus*, p. 282; **2.** *Delphinus* [*Delphinus*] *delphis*, p. 284; **3.** *Delphinus* [*Delphinus*] *canadensis* [=*Beluga catodon*], p. 285; **4.** *Delphinus* [*Phocæna*] *phocæna*, p. 286; **5.** *Delphinus* [*Phocæna*] *gladiator*, p. 286; **6.** *Delphinus* [*Phocæna*] *grampus* [=*D. orca* auct.], p. 287; **7.** *Delphinus* [*Delphinapterus*] *leucas* [=*Beluga catodon*], p. 288; **8.** *Delphinus* [*Heterodon*] *anarnachus*, p. 289; **9.** *Monodon monoceros*, p. 290; **10.** *Monodon microcephalus*, p. 291; **11.** *Physeter* [*Catodon*] *macrocephalus*, 294; **12.** *Physeter* [*Catodon*] *trumpo*, p. 294; **13.** *Balæna* [*Balæna*] *mysticetus*, p. 292; **14.** *Balæna* [*Balæna*] *glacialis*, p. 297; **15.** *Balæna* [*Balæna*] *nodosa*, p. 298; **16.** *Balæna* [*Balænoptera*] *gibbar*, p. 299; **17.** *Balæna* [*Balænoptera*] *boops*, p. 300; **18.** *Balæna* [*Balænoptera*] *rostrata*, p. 301.

The matter relating to the Cetacea is wholly compiled. There is no "internal evidence" that specimens were examined in any case, but the general subject is intelligently handled. [659.]

1825. Harlan, Richard. Notice of the *Pleisiosaurus* and other Fossil Reliquiæ, from the State of New Jersey. <*Journ. Acad. Nat. Sci. Phila.*, iv, pp. 232–236, pl. xiv, fig. 1.

First notice of the Cetacean remains, here erroneously referred to a Saurian, which became later the basis of *Priscodelphinus harlani*, Leidy. *Cf.* Leidy, *Proc. Acad. Nat. Sci., Phila.*, 1851, p. 326. [660.]

1825. Latreille, [P. A.] Familles | naturelles | du Règne Animal, | exposées succinctement et dans un ordre analytique, | avec l'indication de leurs genres. | Par M. [Pierre André] Latreille, | Membre de l'Institut (Académie royale des Sciences), de la Légion-d'Honneur, etc., etc. | — | . . . [= motto, 5 lines]. | — | Paris | J.-B. Baillière, Libraire, | Rue de l'École de Médecine, Nº 14. | Baudouin frères, Rue de Vaugirard, Nº 36. | — | 1825. 8°. ll. 3, pp. 1–570.

Onzième Ordre, Cétacés. *Cetacea*, pp. 64, 65. Première Famille, Herbivores, *Herbivora* (=*Sirenia*). Seconde Famille, Souffleurs, *Hydraula* (=*Cetacea*). Genera enumerated under French names—*Herbivora*, 3 genn.; *Hydraula*, 2 primary unnamed divisions, each with two unnamed subdivisions; genn. 10. [661.]

1825. Lyngbye, Chr. Von dem Fange der Meerschweine auf den Ferroe-Inseln, nebst einem Beitrag zur Naturgeschichte derselben. <*Froriep's Notizen*, etc., xii, no. 245, Okt. 1825, pp. 33–41.

Chiefly about the Grindelwalen, of which two species are distinguished, differing in size. Measurements of these are given at p. 40, as well as also of "*Balæna rostrata.*" There is a detailed account of their external characters, etc. [662.]

1825. Richardson, J. Appendix | to | Captain Parry's Journal | of a | Second Voyage | for | the discovery of a Northwest Passage from | the Atlantic to the Pacific, | performed in | his Majesty's Ships Fury and Hecla, | in | the years 1821–22–23. | — | Published by authority of the Lords Commissioners of the Admiralty. | — | London: | John Murray, | Publisher to the Admiralty and Board of Longitude. | — | MDCCCXXV. 4°. ll. 2, pp. 1–432. >Zoological Appendix.—No. I. Account of the Quadrupeds and Birds, by John Richardson, M. D., M. W. S. pp. 287–399.

Mammalia, pp. 288–341. *Balæna mysticetus*, p. 336. *Monodon monoceros*, p. 336. *Delphinapterus beluga*, p. 337. [663.]

1825. "Rosenthal, F. C., *et* F. Hornschuh. De Balænopteris quibusdam ventre sulcato distinctis; epist. gratul. ad J. F. Blumenbachium, 4 maj. Gryphiswald., Koch, 1825."

Not seen; title from Carus and Engelmann. [664.]

1825. "Scoresby, W. Tagebuch einer Reise auf den Wallfischfang, übers. von Kries, 1825. pp. 178."

Not seen. See the original English edition of 1823. [665.]

1825. Thaarup, F. Statistisk Udsigt | over | den danske Stat | i Begyndelsen af Aaret 1825. | — | Som Haandbog for Forretningsmænd og Bejiledning for | Statistikens Dyrkere. | — | Af | Fr[ederick]. Thaarup. | Stateraad. | — | ".. [=quotation, 9 lines]. | — | Kjøbenhavn. | Forlagt af Fr. Brummer. | Trykt hos C. Græbe. | 1825. 8°. pp. i–xxiv, 1–739, og tab. i–xxxviii.

Marsvinet, *Delphinus phocaena*, pp. 200–202. Hvalfisk-Fangst, pp. 380, 381, 680. [666.]

1825. Thompson, J. L. Bottle-nose Whales. <*Edinb. Philos. Journ.*, xiii, no. 26, 1825, p. 389.

Short description of two specimens, male and female, stranded in East Lothian, Scotland; the female contained two fœtuses. [667.]

1826. Anon. Whale killed in the River St. Laurence, 600 miles from the Sea. <*Edinb. New Philos. Journ.*, [i], 1826, pp. 193–195.

Account of a species of "Finner," 42 feet 8 inches in length, captured near Montreal; "Extract of a letter from Montreal, dated September 13, 1823." [668.]

1826. Baer, [K. E. von]. Ueber den Braunfisch (*Delphinus phocaena*) . . . (Als Vorläufer einer vollständigen anatomischen Monographie dieses Thiers.) <*Isis von Oken*, xix, 1826, pp. 807–811. [669.]

1826. Baer, [K. E. von]. Die Nase der Cetaceen erläutert durch Untersuchung der Nase des Braunfisches (*Delphinus phocaena*). <*Isis von Oken*, xix, 1826, 811–847, pll. v, vi. [670.]

1826. Baer, [K. E. von]. Nachträgliche Bemerkung über die Riechnerven des Braunfisches. <*Isis von Oken*, xix, 1826, p. 944. [671.]

1826. Bakker, G. Eenige woorden over de waarde der ondervinding, ter geleide van waarnemingen over Wormen, bijzonder in het hart en de luchtvaten van Bruinvischen [*Delphinus phocaena*]. <*Bijd. tot de natuurk. Wetensch.*, i, 1, 1826, pp. 449–475. [672.]

1826. "Blocquel, Sim. Ichthyologie de la jeunesse, ou beautés de l'histoire naturelle des Poissons, Cétacés et Crustacés. Avec 60 fig. in-16°. Lille et Paris, 1826."

Not seen; title from Carus and Engelmann. [673.]

1826. Buffon, [G. L. Leclerc] de, *et* [G.] Cuvier. OEuvres | complètes | de Buffon | mises en ordre et précédées d'une notice historique | par M. A. Richard, | Professeur agrégé a la Faculté de Médecine de Paris; | Suivies de deux Volumes | sur les progrès des Sciences physiques et naturelles | depuis la mort de Buffon, | par | M. le Baron Cuvier, | Secrétaire perpétuel de l'Académie royale des Sciences. | [Medallion.] A Paris | Chez Baudouin Frères, Éditeurs, | Rue de Vaugirard, Nº 17, | et chez N. Delangle, Éditeur, | Rue du Battoir, Nº 19. | — | M. DCCC. XXVI. 8°. ll. 3, pp. 1–350.

Les Phoques, les Morses, et les Lamantins, pp. 188–334. Le Dugong, pp. 294–297. Le Lamantin, pp. 297–313. Sur les Lamantins, pp. 313–316. Le Grand Lamantin du Kamtschatka, *Stellerus borealis*, Cuv., pp. 316–326. Le Grand Lamantin des Antilles, *Manatus Americanus* Desm., pp. 326–329. Le Grand Lamantin de la Mer des Indes [=Dugong], p. 329. Le Petit Lamantin d'Amérique, pp. 330–332. Le Petit Lamantin du Sénégal, *Manatus Senegalensis* Desm., pp. 332–334.

In this edition we have the text of the original edition (1765, *q. v.*), with the omission of the references to authorities, followed by the text of the Supplement (1782, *q. v.*), with here also omission of reference to authorities. There are a few brief notes by the editor, signed "A. R." [674.]

1826. Desm[are]st, [A. G.]. Note sur un Cétacé échoué a Havre, et sur un Ver trouvé dans la graisse; par M. H. de Blainville. (*Bull. de la Soc. philom.*, sept. 1825.) <*Férussac's Bull. des Sci. nat.*, vii, 1826, pp. 370–373. [675.]

ɪMMOND, H. H. Notice regarding Fossil Bones of a Whale discovered in the
istrict of Montieth. <*Mem. Wern. Soc. Nat. Hist.*, v, pt. ii, 1826, pp. 440, 441.

Brief description of the remains, which are not specifically determined. [676.]

TORS. Whale-Fishery at Van Dieman's Land. <*Edinb. New Philos. Journ.*,
], 1826, p. 396.

Initiation of the enterprise at Van Dieman's Land, May, 1824. [677.]

SON, R. P. Indication de quelques Cétacés nouveaux observés dans le vo-
ɪge autour du monde de la corvette la Coquille. <*Férussac's Bull. des Sci.
ıt. et de géol.*, vii, 1826, pp. 373, 374.

Delphinus bivittatus, *D. superciliosus*, *D. leucocephalus*, *D. lunatus*, *D. minimus*, *D. malaya
us*, p. 373; *D. maculatus*, *Delphinapterus Peronii*, p. 298.

The "indications" are very brief, and, in some cases, so general as to be valueless. See
xt title for further comment respecting these species. [678.]

SON, R. P., *and* P. GARNOT. Voyage | autour du Monde, | Exécuté par
rdre du Roi, | Sur la Corvette de Sa Majesté, La Coquille, pendant | les an-
ées 1822, 1823, 1824 et 1825, | sous le Ministère et conformément aux instruc-
ons de S. E. M. le Marquis | de Clermont-Tonnerre, Ministre de la Marine; |
t publié sous les auspices | de son Excellence M^{gr} le C^{te} de Chabrol, | Mini-
re de la Marine et des Colonies, | Par M. L[ouis]. I[sidore]. Duperrey, | Ca-
ɪtain de Frégate, Chevalier de Saint-Louis et Membre de la Légion d'Hon-
eur, | Commandant de l'Expedition. | — | Zoologie, | Par MM. [René Pri-
evère] Lesson et [Prosper] Garnot. | — | Tome Premier. = 1re Partie. |
Seal.] Paris. | Arthus Bertrand, Libraire-Éditeur, | Rue Hautefeuille, N°
3. | — | 1826. 4°. Tome Premier, 1re Partie, ll. 2, pp. i–iv, 1–360. Tome Pre-
ıier = 2^{e} Partie, 1828, ll. 2, pp. 361–743. Tome Second = 1re Partie, 1830, ll.
pp. 1–471. Tome Second = 2^{e} Partie, 1830, ll. 2, pp. i–xii, 1–319, 1–155.
Atlas 2°, 1826. Engraved title-page, ll. 4, pll., mammifères, 1–9; Oiseaux,
)–50 + 21bis, 31bis, 35bis; Reptiles, 1–7; Poissons, 1–38; Mollusques, 1–16; Crus-
ıcés, 1–5; Insectes, 1–21 + 14bis; Zoophytes, 1–16.

Chap. IV. Observations générales sur quelques Cétacés, par R. P. Lesson, pp. 177–186. **1.**
elphinus bivittatus, sp. n., p. 178, pl. ix, fig. 3; described and figured from specimens seen
rimming in the sea! **2.** *Delphinapterus Peronii*, p. 179, pl. ix, fig. 1 = *Delphinus peronii*
ıcép. = *Delphinus leucorhamphus*, Péron; description and figure of a specimen taken. **3.**
elphinus superciliosus, sp. n., p. 181, pl. ix, fig. 2. **3.** *Physeter macrocephalus*, p. 182. **4.** *Del-
ıinus lunatus*, sp. n., p. 183, pl. ix, fig. 4; described and figured from specimens seen swim-
ing in the sea! **5.** *Delphinus maculatus*, sp. n., p. 183, not figured; described from speci-
ens seen swimming in the sea! **6.** *Delphinus leucocephalus*, sp. n., p. 184, described from
:amples seen in the sea! **7.** *Delphinus malayanus*, sp. n., p. 184, pl. ix, fig. 5; described and
;ured from a specimen captured. **8.** *Delphinus minimus*, sp. n., p. 185; described from ani-
als seen in the sea. [679.]

CKENZIE, G. S. Notice respecting the Vertebra of a Whale, found in a Bed
f bluish clay, near Dingwall [Scotland]. <*Trans. Roy. Soc. Edinb.*, x, pt. 1,
rt. v, 1826, pp. 105, 106.

A short communication concerning the position in which the bone was found and the ma-
ırial inclosing it. [680.]

= OKEN, LORENZ]. Schlussworte an den Herausgeber der Isis [zu von Baer's
Die Nase der Cetaceen" u. s. w.] <*Isis von Oken*, xix, 1826, pp. 840–842.

Cf. 1826. BAER, K: E. VON. [681.]

NDER, CHR., *und* E. D'ALTON. Die Skelete | der Robben und Lamantine, |
bgebildet und verglichen | von | Dr. Chr[istian Heinrich]. Pander und Dr.
:[duard] d'Alton. | — | — | Bonn, | in Commission bei Eduard Weber, 1826.
bl. 2°. ll. 2, pp. 1–10, pll. i–vii. <Vergleichende Osteologie, von Pander
nd d'Alton, 1821–1831.

Die Lamantine, pp. 8–10, pl. v, (das Skelet des Dugong, *Halicore indica*). Auch pl. vi, das
kelet eines jungen Narwals (*Monodon monoceros*). Pl. vii, Schädeln vom Delphinus (*Del-
hinus Phocaena*, *D. delphis*, *D. leucas*). [682.]

ÉVOST, CONSTANT. Mammifères fossiles. <*Dict. class. d'Hist. nat.*, x, Macl-
in, 1826, pp. 127–129. [683.]

1826. Risso, A. Histoire naturelle | des principales productions | de | l'Europe méridionale | et particulièrement de celles des environs | de Nice et des Alpes maritimes; | par A. Risso, | . . . [= titles, 7 lines]. | Servandis et instruendis viatoribus. | Tome Troisième. | — | A Paris, | Chez F.-G. Levrault, Libraire, | Rue de la Harpe, N. 81; | et même Maison, Rue des Juifs, N. 33, a Strasbourg, | 1826. 8°. ll. 2, pp. i–xvi, 1–480, figg. 1–50, en 16 pll., sans numeros.

Enumeration des Mammifères, Oiseaux et Reptiles des Alpes maritimes, suivie de l'histoire naturelle des Poissons de la Méditerranée qui frequentent leurs côtes et qui vivent dans le golfe de Nice = tom. III. Mammifères, pp. 1–25.—Ordre cinquième, Cétacée, pp. 21–25.—*Delphinus delphis*, *D. tursio*, p. 21; *D. Bayeri*, p. 22; *D. globiceps* (fig. 1), *D. Risso* (Cuv.), (fig. 2), p. 23; *D. Desmaresti*, p. 25, fig. 3.

Delphinus Desmaresti, sp. n. [684.]

1826. Ross, J. C. Journal | of a | Third Voyage for the discovery of a | North-west Passage | from the Atlantic to the Pacific; | performed in the years 1824–25, | in His Majesty's Ships | Hecla and Fury, | under the orders of | Captain William Edward Parry, R. N., F. R. S., | and commander of the expedition. | — | Illustrated by plates and charts. | — | Published by authority of the Lords Commissioners | of the Admiralty. | — | London: | — | John Murray, | publisher to the Admiralty, and Board of Longitude. | — | MDCCCXXVI. 1 vol. 4°. pp. i–xxviii, 1–186, 1 l., 1–151, maps, pll., and woodcc. >Appendix. Zoology. By Lieut. James Clark Ross.

Mammalia, pp. 92–95. *Balæna mysticetus*, p. 94. *Monodon monoceros*, p. 94. [685.]

1826. Saint-Hilaire, Is. G. Lamantin, *Manatus*. <*Dict. class. d'Hist. nat.*, ix, Io-Macis, 1826, pp. 177–181.

General history of the group, pp. 177–180; species, 180, 181. **1.** *Manatus americanus*, Desm., p. 180; **2.** *M. Senegalensis*, Desm., p. 180; Lamantins fossiles, pp. 180, 181.

M. latirostris, Harlan, is considered as not well distinguished. [686.]

1826. Saint-Hilaire, Is. G. Mammalogie, Mammalogia. <*Dict. class. d'Hist. nat.*, x, Macl–Mn, 1826, pp. 63-73.

Historique. [687.]

1826 (*circa?*). Sluyter, D. "Vinvisch, in 1826 gestrand, naar H. Schlegel door *D. Sluyter*. br. folio."

From Bosgoed, *op. cit.*, p. 176, no. 2782. [688.]

1826. Vrolik, W. Waarneming van Wormen, in de Long-aders en Slagader, de takken der Luchtpijp en de Longzelfstandigheid van eenen Bruinvisch, (Delphinus phocaena). <*Bijd. tot de natuurk. Wetensch.*, i, 1, 1826, pp. 77–84. [689.]

1827. Alderson, J. An Account of a Whale of the Spermaceti Tribe, cast on shore on the Yorkshire Coast, on the 28th of April, 1825. <*Trans. Camb. Philos. Soc.*, ii, pt. 2, art. xv, 1827, pp. 253–266, pll. xii–xiv.

External measurements and description of internal parts of a male specimen. Two views of the animal (pl. xii), skull (pl. xiii), side view of skull, eye, etc. (pll. xiv). [690.]

1827. Anon.? "Iets over de Walvisch-vangst in de Zuidzee en den Indischen Oceaan. <Nederl. Hermes. Tijdschr. v. kooph. en zeev., 1827, no. 2, bl. 44–60."

Not seen; title from Bosgoed, *op. cit.*, p. 250, no. 3589. [691.]

1827. Anon.? "De Groenlandsche en Straat Davidsche Walvischvangst. <Nederl. Hermes. Tijdschr. v. kooph. en zeev., 1827, no. 4, bl. 39–55."

Not seen; title from Bosgoed, *op. cit.*, p. 250, no. 3589. [692.]

1827. Boitard, [P.]. Manuel | d'Histoire | naturelle, | comprenant | les trois règnes de la nature; | ou | généra complet des animaux, des végétaux | et des minéraux; | par M. [Pierre] Boitard. | — | Première Partie [et seconde partie]. | — | Paris, | Roret, Libraire, Rue Hautefeuille, | au coin de celle du Battoir, | 1827. 12°.

Les Cétacés (i, pp. 45–49) = *Sirenia* + *Cete*. Briefly mentioned under (mostly) French generic names; species enumerated *passim*, under the Latin names then current. [693.]

[AREST, A. G.]. Rytine; *Rytina*, Ill. <*Dict. des Sci. nat.*, xlvi, 1827, pp. , 477. [694.]

ORS. Professor Harlan on the Mammalia of North America. <*Edinb. rn. Sci.*, vi, 1827, p. 328.

rief notice of Harlan's *Fauna Americana*, 1825, *q. v.* [695.]

NSTONE, LAWRENCE. On the Origin of the Power of suspending Respira- n, possessed by Aquatic Mammalia and Birds. <*Philos. Mag.*, 2d ser., ii, 7, pp. 126–130.

elates mostly to Seals, but contains a paragraph of 7 lines about Whales. [696.]

R, [FRIEDERICH]. Ueber das Blasen der Wale. <*Isis von Oken*, 1827, –860.

egen Baer, *Isis von Oken*, 1826, Heft 8. [697.]

, J. E. Description of the Skulls of two apparently undescribed Species Dolphins, which are in the British Museum. <*Phil. Mag. or Ann. of Chem., th., Astr., Nat. Hist., and Gen. Sci.*, ii, 1827, pp. 375, 376.

elphinus (*Delphinapterus?*) *Kingii*, p. 375; *Delphinus intermedius*, p. 376. [698.]

ON, R.-P. Manuel | de | Mammalogie, | ou | Histoire naturelle | des Mam- fères, | Par Réné-Primeverre Lesson, | . . . [= titles, 11 lines in small type]. lta paucis. | — | Paris, | Roret, Libraire, rue Hautefeuille, | au Coin de le du Battoir | 1827. 12°. pp. i–xv, 1–442.

VIIIe Ordre. Les Cétacées ou Bipèdes, *Cetæ*, pp. 401–432. 1re Tribu. Les Herbivores, pp. , 402. Genre CCXVIIIe–CCXXe [= 3 genn.]. Espèces 1049e–1053e [= 5 spp.]. 2e Tribu. s Souffleurs (*Hydraula*) ou Cétacées ordinaires piscivores, pp. 404–432. Genres CCXXIe– XXXIIe [= 12 genn.]. Espèces 1054e–1124e [= 70 spp.]. *Heterodon dalei*, sp. n.

Sirenia: **1.** *Manatus americanus*, Cuv.; **2.** *M. senegalensis*, Cuv.; **3.** *M. latirostris*, Har- ; **4.** *Halicore dugong*, F. Cuv.; **5.** *Stellerus borealis*, Desm.

Cetacea: Delphinorhyncus, Blainv., 4 spp.; *Delphinus*, L., 18 spp.; *Oxypterus*, Rafinesque, pp.; *Phocæna*, Cuvier, 11 spp.; *Delphinapterus*, Lacép., 3 spp.; *Heterodon*, Blainv., 7 spp.; *nodon*, L., 3 spp.; *Catodon*, Lacép., 4 spp.; *Physalus*, Lacép., 1 sp.; *Physeter*, Lacép., 4 spp.; *læna*, L., 6 spp.; *Balænoptera*, Lacép., 8 spp. Cétacées décrits par M. de Chamisso, d'après s images sculptées en bois par les habitans des îles Aléoutiennes, pp. 420–432, 9 spp., not hnically named.

"*Monsieur*, L'excellent Traité de *Mammalogie* que vous avez rédigé pour l'Encyclopédie, et vous avez coordonné avec autant d'habileté que de savoir les connaissances zoologiques dernes, a été mon principal guide. En suivant toutes les divisions de l'ouvrage fonda- ntal et justement célèbre du règne animal, vous y avez rattaché avec soin tous les tra- ux modernes nationaux et étrangers. . . ."—*Dédication*, à M. A. G. Desmarest, pp. i, viii.

Like the rest of the "Manuel," the part devoted to the *Cetacea* is an indiscriminate com- lation, useful mainly as giving a list of the species described up to this date. [699.]

SSON, R. P.] Atlas | de | Mammalogie, | ou | Histoire naturelle | des Mam- ifères; | composé de 80 planches | Représentant la plupart des Animaux écrits dans | le *Manuel* de *Mammalogie* et dans celui *d'Histoire naturelle*. | [By éne Primevère Lesson.] — | Paris, | Roret, Libraire, rue Hautefeuille, | au oin de Celle du Battoir, | 1827. 12°. pp. 1–16, pll. 1–80. Deux éd.: d'une vec figures noires, de l'autre avec figures coloriées.

Cetacea, pll. lxxvi–lxxx. Pl. lxxvi, fig. 1, le Marsouin (*Phocæna communis*); fig. 2, le Dau- hin (*Delphinus delphis*); fig. 3, le Dauphin à 2 Dents (*Heterodon hunteri*). Pl. lxxvii, fig. 1, Gibbar (*Balænoptera gibbar*); fig. 2, la Jubarte (*B. jubartes*); fig. 3, le Narval (*Monodon onoceros*). Pl. lxxviii, fig. 1, le Trumpo (*Catodon trumpo*); fig. 2, le Microps (*Physeter mi- rops*); l'Épaulard (*Phocæna grampus*). Pl. lxxix, la Baleine franche (*Balæna mysticetus*). l. lxxx, fig. 1, le Rorqual (*Balænoptera rorqual*); fig. 2, la Baleine à bec (*Balæna acuto ros- rata*); fig. 3, le Grand Cachalot (*Catodon macrocephalus*).

None of the figures are new, being simply reduced copies from Sibbald, Martens, Hunter, tc. [700.]

INDEN, P. J. VAN DER. Notice sur un squelette de Balénoptère. Lue à la oc. des Scienc. médic. et natur. de Bruxelles et publiée séparément. Bru- elles, 1827. 8°."

Not seen; title from Carus and Engelmann, *Bibl. Hist. nat.*, ii, p. 1312. [701.]

1827. PANDER, CHR. [H.], *und* E. D'ALTON. Die | Skelete der Cetaceen, | abgebildet und beschrieben | von | Dr. Chr. [H.] Pander und Dr. E. d'Alton. | — | — | Bonn, | In Commission bei Eduard Weber. | 1827. obl. 2°. ll. 2, pp. 1–10, pll. i–vi. <Vergleichende Osteologie, von Pander und d'Alton, 1821–1831.

Einleitung, pp. 1–3. Vergleichende Beschreibung des Skeletes der Walfischartigen, pp. 3–9. Erklärung der Kupfertafeln, p. 10.

Pl. i, Skelet des Braunfisches (*Delphinus phocaena*). Pl. ii, pl. iii, figg. *a–d*, Skelet des schnabelkiefrigen Walfisches (*Balaena rostrata*). Pl. iii, figg. *e*, *f*, Hand und Brustbein vom Jupiterfisch (*Balaena boops*). Pl. iv, figg. *a–d*, Schädel vom grönländischen Wale (*Balaena mysticetus*); figg. *e*. *f*., die fünf Hals- und drei Rückenwirbel, Shulterblatt, Ober,- und Vorderarm vom Jupiterfisch. Pl. v, figg. *a*. *b*., Schädel des Narwales; figg. *c*, *c*, *c*, Schädel des Butzwales (*Hyperoodon edentulus*); figg. *d*, *e*, Shulterblatt und Ober- und Vorderarm vom Pottfisch (*Physeter macrocephalus*). [702.]

1827. "ROSENTHAL, FR. CHR., *u*. F. HORNSCHUCH. Einige naturhistorische Bemerkgn. über die Walle, nebst 1 (lithogr.) Abbild. Dem Hrn. Landrath u. ersten Bürgermeister Dr. S. J. Meyer zur Feier seines 50jähr. Amts-Jubiläums gewidmed. gr. fol. Greifswald, 1827 (Koch)."

Not seen; title from Carus and Engelmann. [703.]

1827. SAINT-HILAIRE, IS. G. Narval, *Monodon*. <*Dict. class. d'Hist. nat.*, xi, Mo—Nso, 1827, pp. 439–443.

History, affinities, and critical remarks on the nominal species of earlier authors, all the species previously described being referred to one, the *Monodon monoceros*. [704.]

1827. TIEDEMANN, F. Hirn des Delphins mit dem des Menschen vergleichen. <*Tiedemann u. Treviranus, Zeitschr. für Physiologie*, ii, H. 2, 1827, pp. 251–263, pl. xii. [705.]

1827. TIEDEMAN, F. The Brain of the Common Dolphin compared with that of Man. <*Edinb. New Philos. Journ.*, [iii], 1827, pp. 296–298.

Abstract from *Zeitschr. für Physiologie*, ii, p. 251, *q. v.* [706.]

1828. BAER, [K. E. VON]. Noch ein Wort über das Blasen der Cetaceen. <*Isis von Oken*, 1828, pp. 927–931.

Gegen Faber, *Isis*, 1827, Bd. xx, p. 868. [707.]

1828. [BROOKES, J.] "A prodromus of a Synopsis Animalium, comprising a catalogue raisonné of the zoological collection of Joshua Brooks. 8°. London, 1828."

Not seen; title from Carus and Engelmann.

As cited by J. E. Gray (*Cat. Cetacea Brit. Mus.*) appears to contain matter of some importance in relation to Cetacea. [708.]

1828. "DUBAR, J. Ostéographie de la Baleine echouée à l'Est du port d'Ostend, le 4 Nov. 1827; précédée d'une notice sur la découverte et la dissection de ce cétacé. Bruxelles, Laurent frères, 1818. 8°. Met 13 platen."

Not seen; title from Bosgoed, *op. cit.*, p. 161, no. 2544. [709.]

1828. EDITORS. Fossil Rib of a Whale, discovered in Diluvium near Kemp Town, Brighton. <*Edinb. New Philos. Journ.*, [v], 1828, pp. 198, 199. [710.]

1828. GODMAN, J. D. American | Natural History. | — | Vol. III. | Part I.—Mastology. | — | By John D. Godman, M. D. | . . . [=titles, 4 lines]. | — | Philadelphia: | Carey, Lea & Carey—Chestnut street. | — | 1828. [Vols. I, II, 1826.] 8°. 1 l. (engraved title-page), pp. 1–264.

Order VIII. *Cete*, pp. 39–145.—Family I, *Sirenia*, pp. 39–55. **1.** *Manatus Americanus*, p. 43, pl. facing p. 43, fig. 3; **2.** *Stellurus Borealis*, p. 49.

Family II. *Cetæ*, pp. 55–145.—**1.** *Delphinus Delphis*, p. 59, pl. facing p. 59; **2.** *D. Gladiater*, p. 67; Fabulous History of the Dolphin, pp. 72–80; **3.** *Monodon Monoceros*, p. 81; pl. facing p. 43, figg. 1, 2, from Scoresby; **4.** *Physeter Macrocephalus*, p. 94; **5.** *Balæna Mysticetus*, p. 98, pl. facing p. 98, from Scoresby; **6.** *Balæna Physalis*, p. 134; **7.** *Balæna Musculus*, p. 141; **8.** *Balæna Boops*, p. 142; **9.** *Balæna Rostrata*, p. 144.

The Whale Fishery, pp. 145–237, pl. facing p. 160, Instruments used in the Capture of the Whale, from Scoresby.

A compilation, mainly from Scoresby, without acknowledgment and generally without citation of authorities. The account of the Right Whale, of the Narwhal, and of "The Whale Fishery," is from Scoresby's "Arctic Regions." The latter is a transcript from Scoresby,

MAN, J. D.—Continued.

L. ii, pp. 207–310, with the omission of a few paragraphs and additions from other parts of oresby's work, the reprint including most of the sub-headings and the foot-notes, without ating the source from which the matter was appropriated. [711.]

AY, J. E. Part I.] [Price 7s. | Spicelegia Zoologica; | or | Original figures nd short Systematic Descriptions | of | New and Unfigured Animals. | By ohn Edward Gray, F. G. S. M. R. S. L. | Honorary Member of the Philosophical Society of Colchester, Corresponding Member of the Maclurean Lyceum, &c., &c. | — | London: Published by Treüttel, Würtz and Co., Soho Square; and W. Wood, Strand. | [1828.] 4°. pp. 1–8, pll. i–vi. [The title occupies the upper fourth of the first page. The date ("British Museum, | July 1, 1828") occurs at the bottom of p. 8.]

Mammalia, pp. 1, 2. Family *Delphinidæ.* Subgenus *Delphinus*, p. 1. **1.** *Delphinus longirostris*, p. 1; **2.** *Delphinus Capensis*, p. 2, pl. ii, fig. 1, animal. Subgenus *Grampus*, p. 2; **3.** *Delphinus (Grampus) acutus*, p. 2; **4.** *Delphinus (Grampus) Heavisidii*, p. 2, pl. ii, fig. 6, animal; **5.** *Delphinus (Grampus) obscurus*, p. 2, pl. ii, fig. 2, animal (young), fig. 3, animal (adult), figg. 4, 5, skulls. Subgenus *Beluga*, p. 2. Subgenus *Phocæna*, p. 2.

Delphinus longirostris, p. 1; *D. Capensis*, *D.* (*Grampus*) *acutus*, *D.* (*Grampus*) *Heavisidii*, *D.* (*Grampus*) *obscurus*, p. 2, spp. nn.

To the subgenus *Delphinus* are referred, besides *D. longirostris* and *D. capensis*, '*D. Delphis*, *leucorhamphus*, *dubius*, *frontatus*, and *Tursio* (*D. truncatus*, Montagu in Wern. Trans., iii, t. 3)," p. 2. To the subgenus *Grampus* are referred, besides the new species here described under this section, "*D. griseus*, Cuv., *D. Grampus*, Linn., *D. globiceps* (which is the *D. melas* of Traill, the *D. deductor* of Scoresby)," p. 2. The subgenus *Beluga* "is formed by the *D. leucas*, Pall.," p. 2. The subgenus *Phocæna*, "comprehending the *D. Phocæna* of Linné," p. 2. These subgenera, like the species, are followed by the letter "*n.*" (=*nobis*).

This work, announced to appear in parts, was not continued beyond Part I. [712.]

8. HAGELSTAM, —. On the Regions of Perpetual Snow in Norway and Sweden. <*Edinb. New Philos. Journ.*, [v.], 1828, pp. 305–308.

Contains a reference to the abundance of Whales on the coast of Nordland. [713.]

8. HARWOOD, J. Communication on the Structure and Economy of the Greenland Whale, made at the Royal Institution of Great Britain. <*Quart. Journ. of Science*, xxvi, 1828, pp. 10–24. ("To be continued.")

A popular general account of *Balæna mysticetus*, based largely on the author's own observations. At the close of the paper are the words "To be continued," but the remainder appears not to have been published. [714.]

328. "LINDEN, P. L. VAN DER. Notice sur un squelette de Baleinoptère exposé à Bruxelles en Juin et Juillet 1828; in-8°. Bruxelles, 1828."

Not seen; title from Van Beneden. *Cf.* 1827. LINDEN, P. J. VAN DER. Can this be the same work? [715.]

1828. L[UROTH]., S. G. Recherches anatomiques sur quelques organes des Cétacés; par W. Rapp. (Naturwissenschaftl. Abhandl.; Tom. I, 2e cah., 1827, pag. 259.) <*Férussac's Bull. des Sci. nat.*, xiv, 1827, pp. 253, 254.

Résumé. [716.]

1828. RÉDACTEURS. Sur le phénomène du soufflage chez les Cétaces; par M. Faber. (*Isis*, 1827, Tom. xx, n°. 10, pag. 858.) <*Férussac's Bull. des Sci. nat.*, xiv, 1828, pp. 252, 253.

Résumé. [717.]

1829. "BERNAERT, MATHIEU BENOIT FELIX. Notice sur la Baleine échouée près d'Ostende le 5 novembre 1827, et sur les fêtes données par M. Kessels, à l'occasion de la prise de possession au nom de S. M. le roi des Pays-Bas du squelette de ce cétacé, in-8. Paris. 1829, imp. de la Normant, 1829. (64 pag.)"

Not seen; title from Carus and Engelmann. [718.]

1829. BRANDT, J. F., *und* J. T. C. RATZEBURG. Medizinische Zoologie | oder | getreue | Darstellung und Beschreibung | der | Thiere, | die | in der Arzneimittellehre in betracht kommen, | in systematischer folge herausgegeben | von | J. F. Brandt and J. T. C. Ratzeburg, | Doctoren der Medizin und Chirurgie, berechtigten Ärzten zu Berlin, Docenten an der Friedrich-Wilhelms- |

1829. **BRANDT, J. F., *und* J. T. C. RATZEBURG**—Continued.

Universität daselbst, Mitgliedern und Ehrenmitgliedern mehrerer Gelehrten-Gesellschaften, etc. | = | Erster Band. | Mit 24 Kupfertafeln unter XXIII Nummern. | = | Berlin | bei den Verfassern und in Commission bei A. Hirschwald. | = | Gedruckt in der Druckerei der Königlichen Academie der Wissenschaften und bei Trowitzsch und Sohn. | 1829. | Der Titel des ersten Bandes wird ausgeschnitten und dieser dafür eingeklebt. | 4°. pp. i–iv, 1–193, pll. i-xxiii+iv^a and one unnumbered = 25.

Cetacea, pp. 90–134, pll. xii–xvi. *Physeter macrocephalus*, pp. 91–94, pl. xii, fig. i, fem. (nach Bonnat.), fig. 2, mas (nach Jonston), pl. xiii, Schädel (nach Cuvier). *Physeter Trumpo*, pp. 94–99, pl. xiv, fig. 1 (nach Robertson). *Physeter polycyphus*, p. 99, pl. xiv, fig. 1 (aus Freycinets Voy.). Die Cachalot-Anatomie, pp. 99–104. Die Verbreitung der Pottwalle, pp. 104–106. Die Lebensart der Pottwalle, pp. 106–108. *Sperma ceti* und Amber, pp. 108–111. *Balaena Mysticetus*, pp. 111–116, pl. xiv, fig. 4, fem. et juv. (nach Scoresby), pl. xvi, fig. 3, Schädel (fig. orig.). *Balaena Boops*, pp. 116–118. *Balaena rostrata*, pp. 119–122, pl. xv, fig. 3, fem. (nach dem Steindruck von Matthiessep), fig. 4, mas (nach Rosenthal), pl. xvi, fig. 1, Skelet, figg. 2–4, Schädel (figg. orig.). *Balaena longimana*, pp. 122–124, pl. xvi, figg. 5–8 (Schnauzentheils des Schädel, Kopfe und Barten—figg. orig.). Die Verbreitung der Walle, pp. 125–127. Die Lebensart der Walle, pp. 127–132. Der Nutzen der Walle, pp. 132, 133. Das Fischbein, pp. 133, 134. Erklärung der Kupfertafeln, pp. 134, 135.

Zweifelhaftere Arten: *Physeter cylindricus*, p. 95, pl. xii, fig. 3 (nach Anderson). *Physeter catodon*, p. 95. *Physeter orthodon*, p. 98. *Physeter* ——? pl. xiv, fig. 3 (aus Colnett's Voy.).

Other species incidentally noticed in foot-notes are: *Balaena glacialis*, *Balaena nodosa*, *Balaena gibbosa*, *Balaena japonica*, *Balaena lunulata*, p. 114, *Balaena punctata*, *Balaena nigra*, *Balaena physalus*, *Balaena musculus*, p. 117.

The synonymy and bibliography of the species formally treated are given in great fullness, as are the external characters and anatomy, so far as then known; also their geographical distribution, habits, and products. Many of the figures are original, and those copied have the originals explicitly indicated. Especially noteworthy is the figure of the skull of *Balæna mysticetus*, from the specimen in the Berlin Museum. Notwithstanding the large number of nominal species of Cachalots admitted, this treatise is one of much importance. As already said, the bibliographical references are very full. [719.]

1829. **C[UVIER]., F.** Zoologie = Mammalogie. <*Dict. des Sci. nat.*, lix, 1829, pp. 357–519.

XI^e Ordre. Les Cétacés, pp. 514–519. I^{re} Famille. Les Cétacés herbivores. Genres: **1.** *Manatus*, **2.** *Halicon* [sic = *Halicore*], **3.** *Rytina*. II^e Famille. Cétacés piscivores. Genres: **1.** *Delphinus*, **2.** *Delphinorhynchus*, **3.** *Phocæna*, **4.** *Delphinopterus* [sic], **5.** *Hyperoodon*. III^e Famille. Les Narvals. Genre: *Monodon*. IV^e Famille. Les Cachalots. Genre: *Physeter*. V^e Famille. Les Baleines. Genre: **1.** *Balæna*, **2.** *Balenopterus* [sic].

Famm. 5; genn. 13. [720.]

1829. **CUVIER, [G.].** Le | Règne Animal | distribué d'après son organisation, | pour servir de base | a l'histoire naturelle des Animaux | et d'introduction a l'anatomie comparée. | Par M. le baron Cuvier, | . . . [= titles, 5 lines] | avec figures dessinées d'après nature. | Nouvelle Édition, revue et augmentée. | Tome I. | — | Paris, | Chez Déterville, Libraire, | rue Hautefeuille, N°. 8; | et chez Crochard, Libraire, | cloître Saint-Benoit, N°. 16. | — | 1829. 8°. pp. i–xxxviii, 1–584.

Neuvième ordre des Mammifères. Les Cétacés, pp. 281–298.

Les Cétacés herbivores = *Sirenia*, pp. 283–285. The same as in the first edition (see 1817. CUVIER, G.) save the addition of a few words to the account of the Dugong.

Les Cétacés ordinaires = *Cetacea*, pp. 285–298.—"Il n'est point de famille de mammifères plus difficile à observer, et dont les descriptions soient plus incomplètes et la synonymie plus vacillante que celle des cétacés. J'ai cherché à ne donner que des espèces authentiques" (p. 287, note 1). Much new matter is now added, and the number of species is considerably increased; the fabulous or very uncertain basis of others is pointed out. The species recognized may be indicated as follows: **1.** *Delphinus delphis* L., **2.** *D. tursio* Bonnaterre, p. 287; **3.** *D. dubius* Cuv., sp. n., **4.** *D. frontalis* Duss., **5.** *D. frontatus* Cuv., **6.** *D. plumbeus* Duss. (? = *D. malaianus* Less. et Garn.), **7.** *D. velox* Duss., **8.** *D. longirostris* Duss., **9.** *D. micropterus* Cuv., p. 288; **10.** *D. rostratus* Cuv., **11.** *D. gangeticus* Roxb., p. 289; **12.** *D. phocæna* L. (12–17 form the genus *Phocæna* Cuv.), **13.** *D. capensis* Duss., **14.** *D. orca*, **15.** *D. gladiator*, p. 289; **16.** *D. aries* Risso, **17.** *D. globiceps*, p. 290; **18.** *D. leucas* Gm. (18–20 are given as Delphinaptères); **19.** *D. leucorhamphus* Péron, **20.** *D. phocænoides* Duss., p. 291

1829. Cuvier, [G.]—Continued.

21. *Hyperoodon* (*D. edentulus* Schreb.), p. 292; **22.** *Monodon monoceros* L., p. 292; **23.** *Physeter* (cachalot macrocéphale de Shaw et Bonnaterre, n'est pas de Linné), p. 294; **24, 25.** Les Physétères de Lacèp., deux espèces, *microps* et *tursio* ou *mular*), p. 295; **26.** *Balæna mysticetus*, p. 296; **27.** *B. physalus* L., **28.** *B. boops* L., **29.** *B. musculus* L., p. 298.

In foot-notes are mentioned the following species, which are considered as indications of what may exist, but which are not sufficiently known to be introduced into the work: **1.** *D. albigena* Quoy et Gaym., **2.** *D. superciliosus* Less. et Garn., **3.** *D. cruciger* Quoy et Gaym., **4.** *D. bivittatus* Less. et Garn., **5.** *D. lunatus* Less. et Garn., p. 288, note 2. *D. griseus* is referred to *D. aries* Risso., p. 290, note 1.

Other species are criticised and rejected, as notably "le dauphin à deux dorsales" of Rafinesque and the *D. rhinoceros* Quoy et Gaym., "ce qui peut faire craindre quelque illusion d'optique," p. 291, note 3.

Compare G. Cuvier (*Recherches sur les ossemens fossiles*) at 1823, where the Cuvierian species here mentioned were first named. [721.]

1829. Desnoyers, J. Observations sur un ensemble de dépôts marins plus récens que les terrains tertiaires du bassin de la Seine, et constituant une Formation géologique distincte; précédées d'un Aperçu de la non simultanéité des bassins tertiaires. <*Ann. des Sci. nat.*, xvi, 1829, pp. 171-214, 402.

Mammifères marins (Lamantin, Dauphin, Dugong, Rorqual, Baleine et Cachalot), pp. 446-448. [722.]

1829. Editors. An enormous Whale. <*Loudon's Mag. Nat. Hist.*, i, 1829, p. 283.

Brief notice of the "Ostend Whale," the skeleton of which was prepared by M. Kessels of Ghent, exhibited there and in London. From *New Monthly Mag.*, no. xcii, p. 357. *See* 1832. Dewhurst. [723.]

1829. Harlan, Richard. Description of a new species of Grampus, (Delphinus, Cuv.) inhabiting the coast of New England. <*Journ. Acad. Nat. Sci. Phila.*, vi, pt. i, 1829, pl. 51-53, pp. i, fig. 3.

D. intermedius, sp. n. (= *Globiocephalus melas*); Salem Harbor, Mass. [724.]

1829. Harwood, [John]. Hands of the Whale. <*Loudon's Mag. Nat. Hist.*, ii, 1829, p. 487.

Popular account—ten lines. [725.]

1829. Holl, Friedrich. Handbuch | der | Petrefactenkunde, | von Friedrich Holl | Mitglied der Academia Truentina zu Ascoli. | — | Mit | einer Einleitung | über die | Vorwelt der organischen Wesen | auf der Erde, | von | Dr. Ludwig Choulant | Professor an der chirurg. medicin. Akademie | zu Dresden | — | Erstes [-viertes] Bändchen | — | — | Dresden, | P. G. Hilscher'sche Buchhandlung. | — | 1829. <Allgemeine | Taschenbibliothek | der | Naturwissenschaften. | — | Neunter Theil. | — | Handbuch der Petrefactenkunde. | Erstes Bändchen. | Dresden, | P. G. Hilscher'sche Buchhandlung. | — | 1829. sm. 8°. pp. i-viii, 1-115.

The four "Bändchen" are paged consecutively (pp. 1-489) with interpolated title-pages for vol. ii-iv. Bändchen iii and iv are dated 1830. The title-pages of vol. ii-iv differ from that of the first by the omission of the second [Einleitung] portion of the title.

Manatus fossilis, p. 69; *Delphinus Delphis*, *D. Bordae*, *D. platyrhynchus* Cuv., *D. stenorhynchus* Cuv., p. 70; *Ziphius cavirostris* Cuv., *Z. longirostris* Cuv., *D. planirostris* Cuv., *Monodon monoceros*, p. 71; *Physeter*, p. 71; *Balaena*, p. 72. [726.]

1829. Hunter, Percival. A Male Spermaceti Whale, Physèter Catòdon (*katō*, below, *odous*, a tooth; teeth in lower jaw only) Lin. <*Loudon's Mag. Nat. Hist.*, ii, 1829, pp. 197, 198.

Brief account of a specimen taken near Whitstable, south coast of England, Feb. 15, 1829. [727.]

1829. Knox, [Robert]. Notice regarding the Osteology and Dentition of the Dugong. <*Edinb. Journ. of Sci.*, i, n. s., no. 1, 1829, pp. 157, 158. [728.]

1829. Lesson, R. P. Rytine ou Stellère, *Rytina*. <*Dict. class. d'Hist. nat.*, xv, Rua-S, 1829, pp. 25-28. [729.]

1829. Mayer, [F. J. C.] Ueber die Geruchsnerven des Delphins. <*Froriep's Notizen*, xxiv, no. 516, Mai 1829, p. 150. [730.]

1829. Morren, Charles F. A. Over de *Balaenoptera rostrata* van Fabricius en beoordeeling der Werken, welke over een Dier dezer sort, den 4den November 1827, ten oosten van de haven van Ostende gestrand, uitgegeven zijn. <*Bijd. tot de Natuurk. Wetenschap.*, iv, 1829, pp. 52–84, fig. 2 (p. 60, tongbeen). [731.]

1829. Rédacteurs. Mémoire sur un Cétacé échoué le 27 novembre 1828, sur la côte dépendante de la commune de Saint-Cyprien (Pyrénées-orientales); par MM. Farines et Carcassonne. In-8°, de 27 pages, Perpignan; 1829, Tastu, Avec une planche représentant la tête de l'animal au trait. <*Férussac's Bull. des Sci. nat.*, xix, 1829, pp. 349, 350.

Résumé. [732.]

1829. Rédacteurs. Notice sur un Cachalot (*Physeter macrocephalus* L.), trouvé sur la côte du York-shire, le 28 avril 1825, avec fig.; par James Alderson. (*Transact. of the Cambridge Philosoph. Society;* ii, 1827, p. 253.) <*Férussac's Bull. des Sci. nat.*, xvii, 1829, pp. 282, 283.

Résumé. [733.]

1829. Rédacteurs. Description d'une nouvelle espèce de Dauphin [*Delphinus intermedius*]; par M. R. Harlan. (Journ. of the Acad. of Nat. Sci. of Philadelphia; Tom. vi, cah. 2, p. 51, 1827.) Avec 1 fig. <*Férussac's Bull. des Sci. nat.*, xviii, 1829, pp. 281, 282.

Résumé. [734.]

1829. Rédacteurs. Sur deux têtes osseuses de Dauphin appartenant à des espèces probablement non décrites; par J. E. Gray. (*Philos. Magaz. and Annals of Philos.*; novr. 1827, p. 375.) <*Férussac's Bull. des Sci. nat.*, xviii, 1829, p. 282.

Résumé.—*Delphinus Kingii*, Gray, et *D. intermedius*, Gray (non Harlan). [735.]

1829. Smith, A. Additions a la zoologie du Sud de l'Afrique. <*Férussac's Bull. des Sci. nat.*, xviii, 1829, pp. 272-278,

Traduc. du *Zoological Journal*, no. 16, Jan.-May, 1829, pp. 433 *et seqq.*
Phocæna Homeii, p. 276. [736.]

1829. Stein, C. G. D. Handbuch | der | Naturgeschichte | für | die gebildeten Stände, Gymnasien | und Schulen, | besonders in Hinsicht auf Geographie | ausgearbeitet | von | D. Christian Gottfried Daniel Stein, | . . . [titles, 4 lines]. | Erster [Zweiter] Band. | — | Dritte verbesserte und vermehrte Auflage. | Mit 135 Abbildungen auf 15 Kupfertafeln. | — | Leipzig, 1829. | T. C. Hinrichsche Buchhandlung. 8°. Erster B., pp. i–viii, 1–382, l. 1; zweiter B., ll. 2, pp. i–xxxii, l. 1, pp. 1–274, pll. i–xv.

Achte Ordnung, . . . *Palmata*, pp. 78–83. *Trichecus* (pp. 82, 83) includes the Sirenians.
Neunte Ordnung, . . . *Cetacea*, pp. 83–87, pl. iv, figg. 28–32. Genn. 4; spp. 10. [737.]

1829. Thompson, Thomas. Physèter *catòdon*. <*Loudon's Mag. Nat. Hist.*, ii, 1829, p. 477, fig. 114.

Original figure of a specimen cast on the Holderness coast in 1825; its skeleton is reported to be in the possession of Sir Clifford Constable, and was later described by Beale (*Nat. Hist. Sperm Whale*, 1839, *q. v.*). [738.]

1829. Woods, Henry. Capture of a Cachalot on the South Coast. <*Loudon's Mag. Nat. Hist.*, ii, 1829, 198–202.

Particulars of its capture, dimensions, and external characters, mainly from the observations of Mr. John Gould of the Zoological Society. The skeleton was presented to the museum of the Zoological Society by Messrs. Enderby and Sturge, "but government having put in a claim to the 'royal fish,' the whole proceeds of it are under arrest, and the bones now lie whitening on the shore" (p. 200). [739.]

1829. Yarrell, William. Notes on the internal appearance of several Animals examined after death, in the collection of the Zoological Society. <*Zoolog. Journ.*, iv, Jan., 1829, pp. 314–322.

Note on the anatomy of *Phocæna communis* at pp. 318, 319. [740.]

1829–30. Fischer, J. B. Synopsis | Mammalium. | — | Auctore | Joanne Baptista Fischer, | Med. et Chir. Doctore. | — | Stuttgardtiae | Sumtibus, J. G. Cottae | MDCCCXXIX. 8°. pp. i–xlii, 1–528.

ER, J. B.—Continued.

nda, Emendanda et Index | ad | Synopsis | Mamalium. | — | Auctore |
Baptista Fischer, | Med. et Chir. Doctore. | — | Stuttgardtiae, | Sum-
. G. Cottae. | MDCCCXXX. l. 1 (bastard title), pp. 329–456, 657–752.
–vii, inter pp. 666, 667. Pp. "329" et seqq. ad p. "456" Addend., etc.,
9–656.

notto; p. iii, Dedicatio; pp. v–x, Praefatio; pp. xi–xxii, Catalogus voluminum earum-
ionum, quae in hoc opere citantur; pp. xxiii–xlii, Conspectus Ordinum et Generum;
'; Addenda et Emendata, pp. "329" (*i. e.*, 529)–666; tab. i–vii, Conspectus distribu-
ammalium geographicæ; pp. 667–745, Index; pp. 747–752, Corrigenda.

A. Artubus anticis apparentibus brachiiformibus posticis compedibus, pp. 501–504.
a. **1.** *Manatus australis*, p. 501; **2.** *M. senegalensis*, p. 502; **3.** *Halicore Dugung*, p.
Rytina Stelleri, p. 504. Species dubiae: *M. latirostris* Harl., *M.? Hydropithecus*
. 502.

B. Pinnis Pectoralibus. Artubus, etc., pp. 504–527, "455" (*i. e.*, 655)–657. = *Cetacea.*
hinus Geoffroyi Desm., p. 504; **2.** *D. coronatus* Fremin., p. 505; **3.** *D. Bredanensis*
505; **4.** *D. macrogenius*, sp. n., p. 505; **5.** *D. Gangeticus* Lebeck, p. 506; **6.** *D. longi-*
iray, p. "455" (*i. e.*, 655); **7.** *D. velox* Dussum., p. "455" (*i. e.*, 655); **8.** *D. Boryi*
). 506; **9.** *D. Delphis* Linn., p. 506; **10.** *D. cruciger* Q. et G., p. 507; **11.** *D. macu-*
et G., p. 507; **12.** *D. dubius* Cuv., p. 508; **13.** *D. frontalis* Dussum, p. "455" (*i. e.*,
l. *D. Tursio* Fabr., p. 508; **15.** *D. niger* La Cép., p. 508; **16.** *D. Malayanus* L. et
8; **17.** *D. plumbeus* Dussum., p. "455" (*i. e.*, 655); **18.** *D. lunatus* L. et G., p. 509;
minimus L. et G., p. 509; **20.** *D. Rhinoceros* Q. et G., p. 509; **21.** *D. Phocæna*
). 509; **22.** *D. Dussumieri* (= *D. capensis* Dussum.), p. "456" (*i. e.*, 656); **23.** *D.*
(= *Phocæna Homei* A. Smith), p. "456" (*i. e.*, 656); **24.** *D. leucocephalus* L. et G.,
25. *D. bivittatus* L. et G., p. 510; **26.** *D. superciliosus* L. et G., p. 510; **27.** *D. acu-*
rampus acutus Gray), p. "456" (*i. e.*, 656); **28.** *D. Heavisidii* (*Grampus Heavisidii*
). "456" (*i. e.*, 656); **29.** *D. obscurus* (= *Grampus obscurus* Gray), p. "456" (*i. e.*, 656);
Orca Linn., p. 511; **31.** *D. griseus* Cuv., p. 512; **32.** *D. Harlani* (= *D. intermedius*
, p. "456" (*i. e.*, 656); **33.** *D. globiceps* Cuv., p. 512; **34.** *D. Cortesii* (fossil), p. 512;
leucas Pallas, p. 513; **36.** *D. Peronii* La Cép., p. 513; **37.** *D. phocænoïdes* Dussum.,
38. *D. Dalei* p. 514; **39.** *D. capensis* Gray, p. 657; **40.** *D. Hyperoodon* Desm., p.
. *D.? spurius* (= *Monodon spurius* Fabr.), p. 515; **42.** *Monodon monoceros* Linn.,
43. *Physeter macrocephalus* Shaw; ? β *Trumpo*, ? γ *Catodon*, p. 518, **44.** *Ph. polycy-*
et G., p. 518; **45.** *Ph. cylindricus* Bonnat., p. 519; **46.** *Ph. Tursio* Linn., ? β *Microps*,
γ *Orthodon*, p. 520; **47.** *Ph. sulcatus* La Cép., p. 520; **48.** *Balaena Mysticetus* Linn.,
β *Glacialis*, p. 522; **49.** *B. australis* Desmoul., p. 522; **50.** *B. Japonica* La Cép., p.
. *B. lunulata* La Cép., p. 522; **52.** *B. Physalus* Linn., p. 523; **53.** *B. borealis* (= *B*;
Rudol.), ? α *Boops* Linn., p. 524 ? β *Musculus* Linn., ? γ *Rostrata* "Müll.," p. 525.
Antiquorum (= *Rorqual de la Mediterranée*, Cuv.), p. 525; **55.** *B. Lalandii* (= *Rorqual*
de Bonne Espérance Cuv.), p. 525; **56.** *B. Quoyi* (= *B. rostrata australis* Desmoul.),
57. *B. punctulata* Desm., p. 526; **58.** *B. nigra* Desm., p. 526; **59.** *B. caerulescens*,
p. 526; **60.** *B. maculata* Desm., p. 526; **61.** *B. Cuvieri* Desmoul. (fossil), p. 527; **62.**
essii Desmoul. (fossil), p. 527.

es dubiae: **1.** *Delphinus canadensis* Desm., p. 505; **2.** *D. Pernettyi* Desm., p. 507; **3.**
jena Q. et G., p. 507; **4.** *D. Mongitori* Desm., p. 509; **5.** *D. intermedius* Gray, p. 511;
Rissoanus Desm., p. 512; **7.** *D. Feres* Bonnat., p. 513; **8.** *D. Kingii* Gray, p. 514; **9.** *D.*
Desm., p. 515; **10.** *Balaena nodosa* Bonnat., p. 525; **11.** *B. gibbosa* Erxl., p. 525.
hinus macrogenius, p. 505; *D. Dussumieri*, p. "456" (*i. e.*, 656); *D. Cortesii*, p. 512; *D.*
i, p. "456" (*i. e.*, 656); *D. Dalei*, p. 514; *Balaena borealis*, p. 524; *B. Quoyi*, p. 526,
spp. nn.

p. veræ; 11 spp. dubiæ; 7 spp. nn. [741.]

IER, G. Prodromus Petromatognosiae animalium systematicae, conti-
bibliographiam animalium fossilium. <*Nouv. Mém. de la Soc. imp. des*
e Moscou, i, 1829, pp. 301–374; ii, 1832, pp. 95–277, 447–458.

ars II, Monographia Animalium fossilium, mammals occupy ii, pp. 100–129. [742.]

HET, GILBERT. Organ auditif du Marsouin. Avec. 1 pl. in-4°. Paris
(11 pag.)"

seen. [743.]

H. H. On the natural history of the dugong (Halicore indicus Desm.),
ermaid of early writers; and particularly on the differences which occur
dental characters. <*Edinb. Journ. Nat. and Geol. Sci.*, i [1829], 1830, p.
72. [744.]

1830. Companyo, L. Mémoire descriptif | et | Ostéographie | de | la Baleine, | échouée | sur les côtes de la mer, près de Saint Cyprien, | Département des Pyrénées-orientales, | Le 27 Novembre 1828, | Par L. Companyo, Docteur en Médecine, | Membre du Comité central de Vaccine, Membre correspondant de la Société | linnéenne de Paris. | Avec figures dessinées d'après nature. | [Vignette.] A Perpignan, | Chez J. Alzine, Imprimeur du Roi. | 1830. 4°. pp. 1–71, pll. i–v.

Avant-Propos, pp. 3–8. Première Partie. Chap. Ier. Considérations générales sur les Cétacées, pp. 9–14. Chap. II. Notice historique, pp. 15–18. Chap. III. Description, pp. 19–22. Chap. IV. Détermination, pp. 23–31. Seconde Partie. Ostéographie. Chap. Ier. Généralités, pp. 32–34. Chap. II. De la tête, pp. 34–46. Chap. III. Du tronc, pp. 47–58. Conclusions, pp. 59–68. Explication des planches, pp. 69–71. Pl. i. Profil de la tête. Pl. ii. Ensemble de la tête. Pl. iii. Base du crâne, mâchoire inférieure. Pl. iv. Os hyoïde, axis, atlas, sternum, côtes. Pl. v. Omoplates, os pelvien, nageoires pectorales.

"Nous pensons donc que la Baleinoptère que nous avons observée est un jeune individu de la *Baleinoptère Rorqual*" (=*Balæna musculus*, Linn.), p. 23. [745.]

1830. G., A. Natural History of the Neighborhood of Cromer [Norfolk, Engl.]. <*Loudon's Mag. Nat. Hist.*, iii, pp. 155–158.

At p. 157 is a notice of the capture of two Baleen Whales, with a statement of their measurements. [746.]

1830. Jonkaire, A. de la. "Considérations sur la Pêche de la Baleine. Paris, 1830. 8°."

Not seen. See *Foreign Quart. Rev.*, vii, 1831, pp. 355–370, for an extended review of this "respectable pamphlet." [747.]

1830. Kaup, J. Versuch einer natürlichen Eintheilung der Säugethiere. <*Isis von Oken*, 1830, pp, 799–802.

Sirenien, p. 801. [748.]

1830. Knox, [R.], *and* [D.] Brewster. Notice regarding the nature of a peculiar Structure observed in the Second Stomach of certain Cetacea, generally considered as simply glandular, but seemingly analogous to the Electric Organs of the Torpedo and Gymnotus . . . To which is annexed the Microscopical Examination of the Structure by *Dr Brewster*. <*Edinb. Journ. of Sci.*, iii, n. s., no. 6, 1830, pp. 325–388.

Based principally on the Porpoise. [749.]

1830. Kuhn, [J.] Description de l'appareil mammaire du Marsouin (*Delphinus Phocena*). <*Férussac's Bull. des Sci. nat.*, xxii, 1831, pp. 322, 323. [750.]

1830. Quoy, J. R. C., *et* P. Gaimard. Voyage | de découvertes | de | l'Astrolabe | exécuté par ordre du Roi, pendant les Années 1826–1827–1828–1829, | sous le Commandement | de M. J. Dumont D'Urville | — | Zoologie | par | MM. [Jean René Constant] Quoy et [Paul] Gaimard. | — | Tome Premier. | — | Paris | J. Tastu, Éditeur-Imprimeur, | N° 36, Rue de Vaugirard. | 1830. 8°. pp. i–l, 1–268. Avec un Atlas de 200 Planches au moins.

Cétacées, pp. 149–152, pl. xxviii, *Delphinus Novæ-Zealandiæ* (sp. n.) et *D. obscurus*. [751.]

1830. Rapp, W. Beiträge zur Anatomie und Physiologie der Wallfische. <*Meckel's Archiv f. Anat. u Phys.*, 1830, pp. 358–368.

Hauptsächlich über *Delphinus phocæna*. [752.]

1830. Rousseau, Emmanuel. Sur l'Existence de moustaches chez les fœtus de Dauphins et de Marsouins. <*Ann. des. Sci. nat.*, xxi, 1830, pp. 351, 352.

"Tels sont les Dauphins et les Marsouins, qui alors portent au-dessus de la lèvre supérieure une ligne de poils raides, prolongée sur les côtés, et y formant une petite paire de moustache." [753.]

1830. Wagler, Joh. Natürliches System | der | Amphibien, | mit | vorangehender Classification | der | Säugthiere und Vögel. | Ein | Beitrag zur vergleichenden Zoologie. | Von | Dr. Joh. Wagler, | Professor der Zoologie und Mitglied der Königlichen Akademie der | Wissenschaften in München. | — | [Motto.] | — | Mit Kupfern und einer Verwandtschaftstafel. | — | München, Stutt-

, **Joh.**—Continued.
nd Tübingen. | In der J. G. Cotta'schen Buchhandlung. | 1830. 8°.
i, 1–354.

malia. Ordo XVI. *Ceti*, Walle, pp. 32–35, 53, 54. Familia I. *Hedraeoglossi*. A. *C.*
anticis in rostri apice. Genus 1. *Manatus* Rondel., p. 32; genus 2. *Halicore* Illig., p.
us 3. *Rytina* Illig., p. 33. B. *C. naribus superiis in rostri basi*. Genus 4. *Balæna*
). 33; genus 6. *Physeter* Linn., p. 33; genus 7. *Cetus* (species: *Delphinus globiceps*
. 33; genus 8. *Delphis* (=*Beluga*), p. 34; genus 9. *Tursio* [=*Delphinapterus* Less.]
: *Delphinus Peronii* Cuv.), p. 34; genus 10. *Nodus* [=*Heterodon* Less.] (species:
us edentulus Schreb.), p. 34; genus 11. *Ceratodon* Briss. [=*Monodon* Linn.], p. 34;
2. *Orca* (species: *Delphinus bidentatus* Hunt.), p. 34; genus 13. *Phocaena*, Cuv., p.
us 14. *Delphinus* Linn., p. 35; genus 15. *Platanista* [=*Susu* Less.], (species: *Del-*
jangeticus), p. 35. *Hedraeoglossi*, fam. n. (=*Sirenia* et *Cetæ*), p. 32.
(p. 33), *Delphis*, *Tursio*, *Nodus*, *Orca* (p. 34), *Platanista* (p. 34), genn. nn.
cal remarks respecting various genera and species of authors are given in foot-notes.
[754.]

, J. F. Annals | of | Philadelphia, | being a collection of | Memoirs,
otes, & Incidents | of the | City and its Inhabitants | from | The days
Pilgrim Founders. | Intended to preserve the recollections of Olden
and | to exhibit society in its changes of manners and | customs, and
ty in its local changes | and improvements. | To which is added | An
dix, | containing | Olden Time Researches and Reminiscences of | New
City. | — | "Oh! dear is a tale of the olden time!" | — | "Where peep'd
t, the palace towers; | Where skimm'd the bark, the war-ship lowers: |
ily carols, where was silence rude; | And cultur'd thousands throng the
le." | — | By John F. Watson, | Member of the Historical Society of
ylvania. | — | Philadelphia, | E. L. Carey & A. Hart; | New York, | G.
& H. Carvill. | 1830. | 8°. pp. i–xii, 1–740 + 1–78 pll.

les and Whalery, pp. 667–668. On the early Whalefishery of the Delaware, with
of the stranding or capture of Whales in the river down to 1809. [755.]

Considérations sur la Pêche de la Baleine. Par A. de la Jonkaire.
. *Quar. Rev.*, vii, 1831, pp. 355–370.

xtended account, in part statistical, of the "progress and present state of the Whale
y," apropos of the appearance of the brochure, the title of which forms the caption of
per. [756.]

). Notice sur l'ostéologie et la dentition du Dugong; par le D^r. Knox.
b. Journ. of Sci., i, 1829.) <*Férussac's Bull. des Sci. nat.*, xxv, 1831, p. 350.
umé. [757.]

, **David.** Observations on the History and Progress of Comparative
omy. . . . Section III. Early Zootomical Authors to Eustachius, 1501–
<*Edinb. New Philos. Journ.*, [xi], 1831, pp. 42–56.

tains an extended critical résumé of Belon's account of the anatomy of the Dolphin as
n that author's "L'Histoire Naturelle des Estranges Poissons Marins, avec la vraie
ure et Description du Daulphin et de plusieurs autres de son espece. Paris 1551," *q. v.*
[758.]

, G. The | Animal Kingdom | arranged in conformity with its organiza-
| by the Baron Cuvier, | Perpetual Secretary to the Royal Academy of
ces, etc. etc. etc. | — | The Crustacea, Arachnides and Insecta, | by P.
treille, | member of the Royal Academy of Sciences, etc. etc. etc. | — |
slated from the French, | with Notes and Additions, | by H. M'Murtrie,
. &c. &c. | — | In four volumes, with plates. | Volume I. [Mammals
Birds.] | New York: | G. & C. & H. Carvill. | MDCCCXXXI. 8°. pp.
ii, 1–448, l. 1, pll. i–iv.

er ix. Cetacea (=*Sirenia* + *Cete*), pp. 202–214.

s is a scholarly translation of the "nouvelle édition" (1829), *q. v.* Says the translator:
mmaculate book is perhaps rather to be wished for than expected, and that errors should
crept into the Règne Animal is not at all surprising. These I have endeavoured to cor-
not by erasure or altering the text (those cases always excepted where the mistake was
ntly and purely typographical), but by note, either on the page itself or in the appendix.
whatever has been added, nothing has been taken away, and the text of my author
ns as I found it" (pp. v, vi). [759.]

1831. Godman, John D. American | Natural History. | — | Vol. III. | Part I.—Mastology. | — | By John D. Godman, M. D. | . . . [=titles, 4 lines]. | Second Edition. | Philadelphia: | Stoddart and Atherton, 60, N. Front Street. | 1831. 8°. pp. 1–264, 9 plates, cuts.

Order viii. *Cete;* Cetaceous Animals, pp. 37–237. For analysis and comment see the *ed. prin.*, 1828, with which this is textually identical. [760.]

1831. Graves, R. J. An account of a Peculiarity not hitherto described in the Ankle, or Hock-joint of the Horse; with Remarks on the Structure of the Vertebræ in the Species of Whale, entitled Delphinus Diodon. <*Trans. Roy. Irish Acad.*, xvi, pt. 2, 1831, pp. 85–91.

On the separation of the vertebral epiphyses in maceration, and the degree of union useful as an index of the age of the animal among Cetaceans, pp. 88–91.

Reprinted in *Edinb. Journ. Sci.*, new ser., iv, 1831, pp. 47–52, and in *Edinb. New Philos. Journ.*, [x], 1831, pp. 59–64. [761.]

1831. Johnston, George. Some account of a Whale stranded near Berwick-upon-Tweed. <*Trans. Nat. Hist. Soc. of Northumberland, Durham and Newcastle upon Tyne*, Vol. I, 1831, pp. 6–8, pl. I.

Account of the external characters and figure of a specimen apparently referable to *Megaptera longimana;* believed by the author to be the *Balæna Boops* of Turton's "British Fauna." [762.]

1831. Knox, [Robert]. Notiz über die Natur einer eigenthümlichen Structur, welche im zweiten Magen gewisser Cetaceen beobachtet worden ist und die man in der Regel als bloss drüsiger Beschaffenheit betrachtet hat, die aber offenbar den electrischen Organen des *Torpedo* und *Gymnotus* analog ist; mitgetheilt in einem Briefe von Dr. Knox. Demselben ist beigefügt die mikroscopische Untersuchung der Structur von Dr. Brewster. <*Froriep's Notizen*, xxix, no. 629, Jan. 1831, pp. 193–196.

Aus *Brewster's Edinburgh Journ. Sci.*, new ser., no. 6, July, 1830. *See* 1830. Knox, R. [763.]

1831. Knox, R. Observations to determine the Dentition of the Dugong; to which are added Observations illustrating the Anatomical Structure and Natural History of certain of the Cetacea. <*Trans. Roy. Soc. Edinb.*, xi, pt. 2, art. xxiii, 1831, pp. 389–417, pl. xv.

[Preliminary remarks on the osteology and dentition of the Dugong], pp. 389–397. The zoölogical arrangement of the Dugong, pp. 398–400. True *Cetacea*, pp. 400, 401. Skeleton of the Narwhal, pp. 401–404. *Delphinus phocæna*, pp. 404, 405. Other specimens of the genus *Delphinus*, pp. 405, 406. Of the size of the Foetus of the *Cetacea* at the time of birth, pp. 406–413. Digestive Organs, pp. 413–416. The plate represents the cranium of adult and young Narwhal, the atlas dentata and third cervical vertebra of the Narwhal, the tooth and gastric cavities. [764.]

1831. Lenz, H. O. Naturgeschichte | der | Säugethiere, | nach Cuvier's Systeme bearbeitet | von Dr. Harald Othmar Lenz, | Lehrer an der Erziehungsanstalt zu Schnepfenthal. | — | (Preis: 1 Thlr. oder 1 fl. 48 fr. Rhnl.) | — | Gotha, | Beckersche Buchhandlung. | 1831. 8°. pp. 1–324.

Neunte Ordnung der Säugethiere: Fischsäugethiere.—*Cetacea*, pp. 294–306.

Sirenia: 3 genera, 4 species. *Cetacea*, 4 genera, 24 species, to wit: *Delphinus*, 14 spp.; *Monodon*, 1 sp.; *Physeter*, 3 spp.; *Balæna*, 6 spp. The notices of the species are very short; the references relate only to figures. The technical names are marked for accent and their etymology is given. Evidently prepared for use as a concise hand-book of Mammalogy. [765.]

1831. Less[on]., [R. P.]. Quelques détails sur un cétacé échoué près Berwich [*sic*], sur la Tweed; par Georges Johnston. (*Trans.* of the nat. hist. society of Northumberland; part I, tom. I, pag. 6, avec une planche.) <*Férussac's Bull. des Sci. nat.*, xxvii, 1831, pp. 184–186.

Résumé. [766.]

1831. M'Murtrie, H. *See* 1831, Cuvier, G.

1831. Mantel, *Mr., of Lewes.* Large [Baleen] Whale recently found in the Channel near Brighton [England]. <*Loudon's Mag. Nat. Hist.*, iv, 1831, pp. 163, 164. [767.]

?], G. Some Account of a Grampus (Delphinus Orca) recently cap-
n Lynn Harbour [England]. <*Loudon's Mag. Nat. Hist.*, iv, 1831, pp.
l, fig. 56.

iption and figure of the specimen. [768.]

P. [S.]. Zoographia | Rosso-Asiatica, | sistens | omnium animalium |
nso Imperio Rossico | et | adjacentibus maribus observatorum | recen-
, domicilia, mores et descriptiones, | anatomen atque icones plurimo-
Auctore | Petro [Simones] Pallas, | Eq. Aur. Academico Petropoli-
— | Volumen Primum. | — | — | Petropoli | in officina Caes. Acade-
Scientiarum impress. MDCCCXI. | Edit. MDCCCXXXI. 3 vols. 4°,
olio atlas. Vol. i, ll. 2, pp. i–xxii, 1–568, ll. 2.

rii Rossici Animalia Lactantia, i, pp. 1–296. Ordo VII. *Cetacea* (= *Sirenia* + *Cetacea*),
296, pll. "xxx–xxii," spp. 142–151. **1.** *Manatus borealis*, p. 272, pl. xxx; **2.** *Delphinus*
p. 273, pll. xxxi (auditus organum), xxxii; **3.** *Delphinus Delphis*, p. 284; **4.** *Delphi-*
caena, p. 284; **5.** *Delphinus Orca*, p. 285; **6.** *Physeter macrocephalus*, p. 287; **7.** *Ba-*
hysalus, p. 289; **8.** *Balaena Boops ?* p. 291; **9.** *Balaena Musculus*, p. 293; **10.** *Cera-*
onodon, p. 295.

. 286 three species of *Physeter* are mentioned under Aleut names, and at p. 288 six
of *Balaena*. These are cited by Chamisso (*Nov. Act. Acad. Caes. Leop.-Carol. Nat.*
xii, 1, 1824, pp. 249–260), who refers to volume and page of Pallas's work, showing
s portion of the work, at least, was accessible to Chamisso as early as 1824, although
monly recognized as "published" till 1831. On this point see Coues, *Birds Col. Val-*
, p. 615. [769.]

FORT, G. Bijdragen tot de ontledkundige Kennis der Walvisschen.
we Verhandl. der eerste Klasse van het Nederl. Inst., 3 D., 1831, pp. 223–
l. 5."

important memoir I have been unable to see. Title from Carus and Engelmann. [770.]

. Beyträge zur Naturgeschichte von Süd Africa. <*Isis von Oken*, 1831,
59–1362.

rsetzung aus der *Zoological Journal*, iv, no. xvi, 1829, pp. 433 *et seqq.*
aena homeii, p. 1362. [771.]

G, W. J. The | Polar Regions | of the | Western Continent Explored; |
cing a | Geographical Account | of | Iceland, Greenland, the Islands of
ozen Sea, | and the | Northern Parts of the American Continent, | in-
g | a particular description of the Countries, the Seas, In- | habitants,
nimals of those Parts of the World; | also, a minute account of the Whale
ies, | and the dangers attending them; | with remarkable adventures of
f the Whale Fishers, | descriptions of Mount Hecla, and the other vol-
of Iceland; | [Vignette.] Together with the | Adventures, Discoveries,
rs, and Trials | of | Parry, Franklin, Lyon, and other Navigators, | in
Regions. | — | By W[illiam]. J. Snelling, | author of Tales of the North-
| — | Illustrated by a map and engravings. | — | Boston: | Printed for
. Reed. | — | 1831. 8°. ll. 2 (title-pages), pp. i–xii, 1–501.

. iii. Early History of the Whale Fishery.—Of the Manner in which a Whale Ship is
.—The Crow's Nest.—Whale Boats.—Implements used in the Whale Fishery.—Whale
—Danger of Striking, pp. 77–82. Chap. iv. Further Account of Whale Killing.—
of Time required to kill a Whale.—Character of the Whaleman.—Anecdotes of the
nd Fishery, pp. 82–88.

ndix, pp. 485–501,—being an account of the Mammals, with numerous cuts, forming
not all zoölogical), entitled "Illustrations for Polar Region," with references to the
tions of the species in the text. The Narwal, pp. 494, 495. There is a cut of a "Sperma-
hale."

e object of this work . . . is . . . to give the reader a condensed account of what is
of the northern regions of the new world, from the latest and best authorities. To
l the compiler has availed himself of the writings of Henderson, Crantz, Parry, Frank-
hardson, Kotzebue, and others, and, in many instances, has used their own words."—
's preface. [772.]

OH[ANN] BAPT[IST] VON, *und* CARL FRIEDR. PHIL. VON MARTIUS.
| in | Brasilien | auf Befehl Sr. Majestät | Maximilian Joseph I. | Königs
aiern | in den Jahren 1817 bis 1820 | gemacht | von | weiland Dr. Joh.
von Spix, | . . . [= titles, 3 lines] | und | Dr. Carl Friedr. Phil. von

1831. Spix, Joh[ann] Bapt[ist] von, *et al.*—Continued.
Martius, | . . . [=titles, 4 lines.] | [Erster–] Dritter und letzter Theil, | bearbeitet und herausgegeben von | Dr. C. F. P. von Martius. | Mit sieben Blättern Charten und zwei Tafeln Abbildungen. | — | München, [1823–]1831, | bei dem Verfasser. Leipzig, in Comm. bei Friedr. Fleischer. 3 vols. 4°. mut. mut. Vol. iii, pp. i–lvi, 883–1388.

Vol. i, 1823; vol. ii, 1828; vol. iii, 1831.

Delphin vom Amazonas (*Delphinus amazonas*, sp. n.), pp. 1118–1120, 1133. Lamantin oder Manati (*Manatus americanus*), pp. 1121, 1122. [774.]

1832. Bronn, H. G. Delphinus (Paläontologie). <*Ersch und Gruber's Allgem. Encyklop. der Wissensch. und Künste*, Erste Sect., xxiii, 1832, pp. 420–422.

4 spp. [775.]

1832. Cuvier, F., *et Dr.* Dumezille. Histoire naturelle | des | Mammifères, | Par M. F. Cuvier, | Membre de l'Institut (Académie royale des Sciences), etc. | et | Le Docteur Dumezille. | — | Tome premier [et second]. | — | Paris, | Rue et place Saint-André-des-Arts, N° 30. | — | 1832. 12°. Vol. i, pp. 1–108; vol. ii, l. 1, pp. 1–100.

Dixième ordre. Les Cétacés, vol. ii, pp. 48–56. [776.]

1832. Dewhurst, Henry William. Observations on the Zoology and Comparative Anatomy of the Skeleton of the Balænóptera *Rórqual*, or Broad-nosed Whale, now exhibiting at the Pavilion, King's Mews, Charing Cross. <*Loudon's Mag. Nat. Hist.*, v, 1832, pp. 214–233.

General History of the Whale Tribe, pp. 214–219; History of the Balænóptera *Rórqual*, pp. 219–233. This is the "Ostend Whale," found floating dead Nov. 4, 1827, between the coasts of England and Belgium, prepared under the direction of M. Kessels and exhibited at Ghent, London, and elsewhere, and which was the subject, in part or wholly, of several earlier memoirs. [777.]

1832. "Marec, —. Dissertation sur la pêche de la baleine, faisant suite à celle sur la pêche de la morue, pour servir à la discussion du projet de loi présenté, sur l'une et l'autre pêches à la chambre des Députés. Paris, Giraudet. 1832. 4°."

Not seen; title from Bosgoed, *op. cit.*, p. 242, no. 3509. [778.]

1832. Meyer, Hermann von. Palaeologica | zur | Geschichte der Erde | und | ihrer Geschöpfe. | Von | Hermann von Meyer, | . . . [=titles, 4 lines]. | — | — | Frankfurt am Main. | Verlag von Siegmund Schmerber. | 1832. 8°. pp. i–xii, 1–560.

Cetaceen, pp. 98–100. *Manatus* (Lamantin) *fossilis*, Cuv., p. 98; *Delphinus Cortesii*, *D. macrogenius*, *D.* ———, *D. longirostris*, p. 99; *Monodon fossilis* (?) Cuv., p. 99; *Ziphius carirostris*, Cuv., p. 99; *Z. planirostris*, Cuv., *Z. longirostris*, Cuv., p. 100; *Balæna Cuvieri*, Desmoul., *B. Cortesii*, Desmoul., p. 100. [779.]

1832. Rafinesque, C. S. Remarks on the Monthly Journal of Geology and Natural Science of G. W. Featherstonaugh, for May, 1832, (but only published in July.) <*Atlantic Journ.*, i, no. 3, autumn of 1832, pp. 110–114.

"As to the bone called *Nephrosteon*, I acknowledge that it may be the Epiphysis of a Whale, as Dr. H[arlan]. did tell me in 1831, after my pamphlet was published. But it is, perhaps a new Whale, since he could not find it in Cuvier's (ossemens fossiles). *Nephrosteon* is however a very good name, and may become specific" (p. 112). *Cf.* Harlan, *Trans. Geol. Soc. Penn.*, i, pt. i, 1834, p. 75. [780.]

1832. Rosenthal, Friedrich Christian. Über die Barten des Schnabel-Walfisches (*Balaena rostrata*). <*Abhandl. der Kön. Akad. der Wissensch. zu Berlin*, 1829 (1832), pp. 127–132, pll. i–v. [781.]

1832. Rudolphi, [D. K. A.]. Über *Balaena longimana*. <*Abhandl. d. phys. Kl. d. Kön. Akad. d. Wissensch. zu Berlin*, 1829 (1832), pp. 133–144, pll. i–v.

Osteologische. Pl. i, Skelet; pll. ii, iii, Schädel; pl. iv, linker Beckenknochen in nat. Grösse; pl. v, der Walfisch selbst. [782.]

1832. Schübler, [G.?]. [Ueber Fossilen aus der Molasse von Baltringen.] <*Jahrb. für Mineral., Geogn., Geol. und Petrefakt.*, iii, 1832, pp. 79, 80.

Bruchstücke eines Unterkiefers einer *Balaena*, p. 79. [783.]

ER, J. History | of the | Town of Plymouth[, Mass.]; | from its first
ment in 1620, to | the year 1832. | — | By James Thacher, M. D., A. A. S.,
— | "Ask thy fathers, and they will show thee; thy elders, and they
ell thee." | — | Boston: | Marsh, Capen & Lyon. | 1832. 6°. pp. i–xi,
2, map, and frontispiece.
ales at Plymouth, p. 20. Whale Fishery, pp. 343, 344. [784.]

D. Delphinus Linné (Mammalia), Delphin. <*Ersch und Gruber's*
m. Encyklop. der Wissensch. und Künste, Erste Sect., xxiii, pp. 413–420.
enty-eight species are given, divided among 6 subgenera, as follows: *Delphinorhynchus*
., 4 spp.; *Delphinus* Blainv., 10 spp.; *Oxypterus* Raf., 2 spp.; *Phocæna* Cuv., 7 spp.;
inapterus Lacép., 2 spp.; *Hyperoodon*, 2 spp. [785.]

T, J. F. Über den Zahnbau der Stellerschen Seekuh (*Rytina Stelleri*)
t Bemerkungen zur Charakteristik der in zwei Unterfamilien zu zerfäl-
en Familie der pflanzenfressenden Cetaceen. <*Mém. de l'Acad. imp. des*
le St.-Pétersbourg, vi^e^ sér., ii, 1833, pp. 103–118, pl.
licoreae, *Rytineæ*, tribb. nn. [786.]

:HET, GILBERT, *et* VAUSELLE. Observations anatomiques sur la tête
e baleine.] <*Nouv. Bull. des Sci., publié par la Soc. philom de Paris*, Ann.
4^e^ sér., ii, 1833, p. 82. [787.]

IGNY, A. Notice sur un nouveau genre de Cétacé, des rivières du centre
Amérique méridionale. <*Nouv. Ann. du Mus. d'Hist. nat.*, iii, 1834, pp.
5, pl. iii.
a boliviensis, gen. et sp. n., p. 31. Pl. iii, fig. 1, vu de profil; fig. 2, tête osseuse; fig. 3,
. [788.]

:NOY, —. [Note sur la découverte récente faite par M. Harlan, dans
érique, de plusieurs nouvelles espèces de Sauriens fossiles.] <*Bull. Soc.*
de France, iv, 1833–34, pp. 123, 124.
silosaurus (=*Zeuglodon*, Owen), p. 124. [789.]

RS. Antediluvian Ambergris. <*Edinb. New Philos. Journ.*, xv, 1833, p.

id to occur in the clay ironstone of the coal-formation near Bathgate, Burntisland. [790.]

CHER, J. F. VAN OVERMEER. Bijdrage tot de kennis van het Japansche
:. Met platen. Amsterdam, J. Muller, 1833. 4°."
Zie aldaar: De walvisch en andere visschen. bl. 217–18."
ot seen; title from Bosgoed, *op. cit.*, p. 163, no. 2572. [791.]

ITE, JULES. Pratique | de la Pêche | de la Baleine | dans | les Mers du
. | — | Par Jules Lecomte. | Redacteur en chef du Navigateur. | [Vi-
tte.] Paris. | Lecomte et Pougin, Éditeurs, | Quai des Augustins, 49. |
helier, Libraire éditeur, même quai. | — | 1833. 8°. pp. i–xvi, 1–280.
oup d'œil historique sur la pêche de la Baleine, depuis les premiers essais jusqu'à nos
, pp. ix–xvi. De la Coque du Navire, pp. 1–14. Observations sur le gréement, pp. 15–18.
matériel, pp. 19–28. Suite du matériel, pp. 29–35. Des vivres et secours médicaux, pp.
3. Du personnel, pp. 44–47. Travaux du mer, pp. 48–58. Suite des travaux de mer, pp.
6. Anatomie de la Baleine (de la franche), pp 67–85. Des autres espèces de Baleines,
36–102 (du Cachalot, pp. 86–94; de la Baleine à aileron = La Baleinoptère gibbar de Lacé-
, pp. 95–97; de la Baleine à bosse, p. 97; le Soufleur, p. 98; du Requin, du Dauphin gladia-
et de l'Espadon, pp. 99–102). Lieux de pêche, pp. 103–125. Suite des Parages de pêche,
136. Introduction à la pêche, pp. 137–140. De la pêche, pp. 141–171. De la manœuvre
piroques, pp. 172–179. De l'amarrage de la Baleine, pp. 180–196. Des autres travaux, pp.
219. De l'emploi ultérieur de l'huile de Baleine, pp. 220–223. Lois et ordonnances sur la
ie de la Baleine, pp. 224–278. [792.]

IE, [JOHN], [ROBERT] JAMESON, *and* HUGH MURRAY. Harper's Stereotype
ition. | — | Narrative | of | Discovery and Adventure | in the | Polar Seas
l Regions: | with illustrations of their | Climate, Geology, and Natural
story: | and an account of | the Whale-Fishery. | — | By Professor [John]
slie, Professor [Robert] Jameson, | and Hugh Murray, Esq. F. R. S. E
– | New-York: | Printed by J. & J. Harper, 82 Cliff St. | . . . [=six lines,

1833. Leslie, [John], [Robert] Jameson, *and* Hugh Murray—Continued.
names of booksellers]. | — | 1833. 12°. Prelim. title-page, with vignette "Perils, attending the Whale-Fishery," pp. i–viii, 9–373, map, and cuts. = The Family Library, no. xiv.

Chap. ii. Animal and Vegetable Life in the Polar Regions, pp. 53–82.—*Cetacea*, pp. 55–61,—a popular compiled general account of "the Whale" (*Balæna mysticetus*), Finner Whales, the Cachalot and "Narwal," with a cut (facing p. 57) entitled "Whale with its Cub, Narwal, etc.," the principal figures from Scoresby.

Chap. ix. The Northern Whalefishery, pp. 297–351; cuts of harpoons, lance, etc., p. 315. Based largely on Scoresby's account of the Northern Whalefishery.

There are later reprints from the same stereotype plates, the title-page only modified. The work appeared originally at Edinburgh (8°, Oliver and Boyd), as vol. i of the *Edinburgh Cabinet Library* (not seen by me), probably in 1832 or 1833, of which the Harper edition is a literal reprint. A fifth Edinburgh edition appeared in 1845, and a German translation in 1834. *See* Bosgoed, *op. cit.*, p. 241, no. 3501. [793.]

1833. Lesson, [R. P.]. Allgemeine Bemerkungen über einige Wale. <*Isis von Oken*, 1833, pp. 42, 43.

Uebersetzung aus "Voyage autour du monde exécuté par ordre du Roi sur la Corvette La Coquille pendant les années 1822–1825, Zoologie par Lesson, cap. 4, p. 177." [794.]

1833. Meyen, F. J. F. Beiträge zur Zoologie, gesammelt auf einer Reise um die Erde. Zweite Abhandlung. Säugethiere. <*Nova Acta Phys.-med. Acad. Cæs. Leop.-Carol. Nat. Curios.*, xvi, p. ii, 1833, pp. 549–610, pll. xl–xlvi.

Delphinus coeruleo-albus, sp. n., pp. 609, 610, pl. xliii, fig. 2. Gegend des Rio de la Plata. [795.]

1833. Parkinson, James. Organic Remains of a Former World. | — | An Examination of the | Mineralized Remains of the Vegetables and Animals | of the | Antediluvian World; | generally termed extraneous fossiles. | — | By James Parkinson. | In three Volumes. | [Vignette.] Encrinus. Stone Lilly. | The third Volume; | containing | the fossil Starfish, Echini, Shells, Insects, Amphibia, Mammalia, &c. | Second Edition. | — | London: | M. A. Natali, 24, Tavistock-Street, Covent-Garden. | — | M. DCCC. XXXIII. | T. Combe, Junior, Gallowtree-gate, Leicester. 4°. Frontispiece, l. 1, pp. ix–xii, ll. 2, pp. 1–467, ll. 2+ll. 8, pll. i–xxii.

A few remarks about Cetaceans and Sirenians occur at pp. 321, 322, and a tooth presumed to be Cetacean is figured in pl. xx, fig. 1. [796.]

1833. Roussel de Vauzème. [Présentation d'un modèle en plâtre d'un fœtus de Baleine extraite en sa présence du sein de sa mère, aux environs de l'île Tristan d'Acunha.] <*L'Institut*, 1^re^ ann., no. 13, 10 août 1833, p. 106.

Avec remarques historiques. [797.]

1833. Saint-Hilaire, Bourjot. Considérations sur le nerf facial, dans ses rapports avec les évents, et sur son influence dans l'acte de la respiration chez le marsouin. <*L'Institut*, 1^re^ ann., no. 32, 21 déc. 1833, p. 266.

Résumé. [798.]

1833. Sampson, William. Notice of a Cetaceous Animal supposed to be new to the American coast. <*Am. Jour. Sci. and Arts*, xxv, 1833, pp. 301–303, fig.

"*Phocæna globiceps*" = *Globiocephalus melas*. Short description and figure of the animal, with synonymy and general remarks. [799.]

1833. Serres, Marcel de. Mémoire sur la question de savoir si des animaux terrestres ont cessé d'exister depuis l'apparition de l'homme, et si l'homme a été contemporain des espèces perdues, ou du moins qui ne paraissent plus avoir de représentans sur la terre. <*Bibl. univ. des Sci. et Arts*, liii, 1833, pp. 277–314.

II. Des êtres réels et actuellement existans, répresentés ou sculptés sur les monumens antiques, et dont on peut reconnaître les espèces, pp. 295–314.—Mammifères marins ou Cétacés, p. 303 (*Trichechus manatus*. Le lamantin d'Afrique. *Delphinus delphis*, *Balæna mysticetus*). [800.]

1833. "Siewald, H. von. De cranii formatione in Delphino Phocaena. Cum 2 tab. Dorpati, 1833. 8°."

Not seen; title from Carus and Engelmann. [801.]

1833–34. T.-C. [=Théodore Cocteau.] Baleine. <*Dict. pittoresque d'Hist. nat. et des Phénom. de la Nature*, i, livrr. xlvi, xlvii [1834?], pp. 365–373.

[Observationes générales], pp. 365–368, 370–373. [Espèces]: 1. *Balæna mysticetus*, p. 368, pl. xxxix, fig. 1; 2. *B. Physalus*, p. 368; 3. *B. Boops*, 4. *B. Musculus*, 5. *B. rostrata*, 6. *B. nodosa*, p. 369, [802.]

1833–34. P. G. [=Paul Gentil.] Cachalot, *Physeter*. <*Dict. pittoresque d'Hist. nat. et des Phénom. de la Nature*, i, livr. lxx [1834?], pp. 557–559.

[Observations générales], pp. 557–559. [Espèces]: 1. Le Grand Cachalot, *Physeter macrocephalus*, p. 559, pl. lxiii, fig. 1; 2. Cachalot trumpo, *Catodon macrocephalus*, p. 559; 3. Cachalot australasien, p. 559; 4. *Physeter microps*, p. 559; 5. *Physeter tursio* ou mular, p. 559; 6. Cachalot sillonné, p. 559. [803.]

1834. Anon. Animal and Vegetable Physiology considered with reference to Natural Theology. By Peter Mark Roget, M. D. <*Edinb. Rev.*, lx, 1835, pp. 142–179.

A review of the work, giving, at p. 171, an extract from it describing the "Filter of the Whale," or the "curious contrivance" of the Whale-bone Whales by which they are enabled to capture their food. [804.]

1834. [Bennett, E. T. On the structure and use of the Monotrematic glands, and particularly on those glands in the Cetacea.] <*Proc. Zool. Soc. Lond.*, 1834, pp. 26, 27.

A brief *résumé* of the views of Geoffroy Saint-Hilaire on this subject. [805.]

1834. Breschet, G., *et* Roussel de Vauzème. Recherches anatomiques et physiologiques sur les appareils tégumentaires des animaux. <*Ann. des Sci. nat.*, 2e sér., Zool., ii, 1834, pp. 167–238, 321–370, 2 pll.

Cétacés *passim*. [806.]

1834. Brongiart, Alex., *et* F. Cuvier. Rapport fait à l'Académie des sciences sur un Mémoire de M. Christol ayant pour objet de ramener au genre Dugong les débris fossiles que M. G. Cuvier avait rapprochés des Hippopotames. <*Ann. des Sci. nat.*, 2e sér., i, Zool., 1834, pp. 282–290.

Sur *l'Hippopotame moyen* de G. Cuvier. *See* 1834. Christol, J. de. [807.]

1834. Chauvin, —. [Sur les mamelles de Cétacé.] <*L'Institut*, 2e ann., no. 48, 12 avril 1834, p. 118. [808.]

1834. [Christol, J. de.] Extrait d'un Mémoire intitulé: Comparaison de la population contemporaine des mammifères de deux bassins tertiaires du département de l'Hérault, presenté à l'Académie des Sciences de Paris, le 24 février 1834, par M. J. de Christol. <*L'Institut*, 2e ann., no. 42, 1 mars 1834, pp. 75, 76. [809.]

1834. Christol, Jules de. Mémoire sur le Moyen Hippopotame fossile de Cuvier, replacé au genre des Dugongs. <*Ann. des Sci. nat.*, 2e sér., ii, Zool., 1834, pp. 257–277, pl. xiii.

Halicore Cuvierii, gen. et sp. n., p. 274=*Hippopotamus medius*, Cuvier. Pl. xxiii, mâchoire inférieure et molaires de *Moyen Hippopotame fossile* de Nantes (*Hippopotamus medius*, Cuv., *Halicore Cuvierii*, Christol); mâchoire inférieure et molaires de Dugong fossile de Montpellier (*Halicore Cuvierii*, Christol); tête et mâchoire inférieure de Dugong vivant, et d'Hippopotame, etc. [810.]

1834. Dewhurst, H. W. The | Natural History | of the | Order Cetacea, | and the | oceanic inhabitants | of the | Arctic Regions. | — | By William Henry Dewhurst, Esq., | . . . [=titles, etc., 10 lines]. | — | . . . [=mottoes, 7 lines]. | — | Illustrated with numerous lithographic | and wood engravings. | — | London: | Published by the Author, | 16, William Street, | Waterloo Bridge Road. | — | MDCCCXXXIV. 8°. ll. 2, pp. i–xx, 1–331.

Natural History of the order Cetacea, pp. 1–204. Order I. Edentatæ, or Toothless Cetacea. General history and character of Whales, pp. 10–15. 1. *Balæna mysticetus*,[*] pp. 15–85. 2. *Balæna islandica* vel *nordcaper*, pp. 86–91. 3. *Balænoptera gibbar*, pp. 92–97. 4. *Balænoptera acuto-rostrata*, pp. 97–101. 5. *Balænoptera jubartes*, pp. 101–107. 6. *Balænoptera rorqual*, pp. 107–129.

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[*] The specific names are in all cases capitalized, both in the text and on the plates.

1834. Dewhurst, H. W.—Continued.

Order II. Predentate Cetacea, or those with teeth only in the anterior part of the upper jaw, pp. 130, 131. **7.** *Monodon monoceros*, pp. 131–142. **8.** *Monodon microcephalus*, pp. 142–144. **9.** *Arnanacus groënlandicus*, pp. 145, 146.

Order III. Subdentate Cetacea, or those having teeth only in the lower jaw, p. 147. **10.** *Physeter macrocephalus*, pp. 148–157. **11.** *Physeter cetadon* [*sic*], p. 158. **12.** *Physeter trumpo*, pp. 159–160. **13.** *Physeter cylindricus*, p. 161. **14.** *Physeter microps*, pp. 162–164. **15.** *Physeter mular*, p. 164 **16.** *Physeter bidens sowerbyi*, pp. 165–167. **17.** *Physeter gibbosa*, p. 168.

Order IV. Ambidentate Cetacea, or those having teeth in both jaws, p. 169. **18.** *Delphinus phoceana* [*sic*] *communis*, pp. 170–174. **19.** *Delphinus didelphis* [*sic*], pp. 174–178. **20.** *Delphinus orca communis*, pp. 178–181. **21.** *Delphinus gladiator*, pp. 181, 182. **22.** *Delphinus bidentatus*, p. 182. **23.** *Delphinus feres*, p. 183. **24.** *Delphinus tursio*, p. 184. **25.** *Hyperöodon butskopf*, vel *Delphinus deductor*, pp. 185–190. **26.** *Delphinapterus beluga*, pp. 190–193.

Concluding observations on the Cetacea, pp. 194–204.

The book closes with a fitting and diagnostic "Appendix" devoted to "Testimonials, Certificates, Letters, etc., etc.," which, as the saying is, "should be seen to be appreciated."

Besides numerous wood-cuts, there are plates of the following species, none of them original, and most of them are even poor copies—almost too poor to render the originals from which they were taken recognizable in them: *Balæna mysticetus*, *Balæna islandica*, *Balænoptera gibbar*, pl. to face p. 15. *Balænoptera acuto-rostratus*, pl. to face p. 97. *Balænoptera jubartes* and *Balænoptera rorqual*, pl. to face p. 107. Skeleton of *Balænoptera rorqual*, pl. to face p. 115. *Monodon monoceros* (two figures), pl. to face p. 131. *Physeter macrocephalus* and *Physeter microps*, pl. to face p. 148. *Physeter cylindricus*, pl. to face p. 161. *Physeter bidens sowerbyi*, pl. to face p. 165. *Physeter gibbosa*, pl. to face p. 169. *Delphinus didelphis* [*sic*] and *Delphinus phoceana* [*sic*], pl. to face p. 170. Skull and Skeleton of Porpoise (too wretched for criticism), pl. to face p. 174. *Delphinus orca communis*, pl. to face p. 178. *Delphinus gladiator* and *Delphinus tursio*, pl. to face p. 184. *Delphinus deductor* and *Delphinus bidens*, pl. to face p. 185. *Delphinapterus beluga*, pl. to face p. 190.

From the standpoint of systematic zoology, the present work merits little consideration; it contains, however, a modicum of information based on the author's own observations, which in some degree redeems it from being merely an indiscriminate compilation, which is, however, its general character. [811]

1834. Duméril, [Auguste]. Extrait d'un rapport fait à l'Académie des Sciences par M. Duméril sur un mémoire ayant pour titre: Considérations sur le nerf fascial et sur son influence dans l'acte de la respiration chez le Marsouin; par Bourjot Saint-Hilaire. <*Ann. des Sci. nat.*, 2e sér., ii, Zool., 1834, pp. 255–257. [812.]

1834. Duméril, [A. M. C.]. Rapport fait à l'Académie des Sciences par M. Duméril, sur un Mémoire intitulé: Description d'un organe vasculaire découvert dans les cétacés, suivie de quelques considérations sur la respiration chez ces animaux et chez les Amphibies, par M. G. Breschet. <*Ann. des Sci. nat.*, 2e sér., ii, Zool., 1834, pp. 376–380.

Voici les conclusions du mémoire de M. Breschet par les rédacteurs, *loc. cit.*, p. 379. [813.]

1834. [Duméril, A. M. C.]. Rapport verbal sur une lettre de M. le Piez, D. M. à Sainte-Germain-en-Laye, relative à l'anatomie du marsouin; lu à la séance de l'Académie royale des sciences du lundi 8 février 1835. <*Ann. des Sci. nat.*, 2e sér., ii, Zool., 1834, pp. 380–382. [814.]

1834. Duméril, [A. M. C.], F. Cuvier *et* [J. B.] Dumas. [Rapport sur les organes génitaux externes du *Delphinus globiceps*, d'après les pièces adressées par M. Le Maoût.] <*L'Institut*, 2e ann., no. 48, 12 avril 1834, p. 117. [815.]

1834. Edwards, H. Milne. Élémens | de Zoologie, | ou | Leçons | sur l'anatomie, la physiologie, | la classification | et les mœurs des Animaux, | par | H. Milne Edwards, | Docteur en Médecine, | Professeur d'Histoire naturelle au Collége royal de Henri IV | et à l'École centrale des Arts et Manufactures. | — | Paris. | Chez Crochard, Libraire, | Place de l'École de Médecine, N. 13. | — | 1834. 8°. pp. i–viii, 1–1053, l. 1. Numerous cuts in the text.

Ordre des Cétacés, pp. 468–486. Famille des Cétacés herbivores, pp. 471, 472. Famille des Cétacés ordinaires ou Souffleurs, pp. 471–486. Divisée en 1. Tribu des Delphiniens; 2. Tribu des Cétacés à grosse tête.

A brief review of the genera and species, mostly under French names. [816.]

1834. **Felt, J. B.** History | of | Ipswich, Essex, and Hamilton. | — | By Joseph B. Felt. | — | Magno usui est memoria rerum gestarum. | Sallust. | — | Cambridge: | Printed by Charles Folsom. | 1834. 8°. pp. i–xvi, 1–304.

Whalefishery engaged in at Ipswich, 1707, on a small scale, p. 109. [817.]

1834. "**Geoffroy-Saint-Hilaire, Etienne.** Philosophie anatomique: fragmens sur la structure et les usages des glands mammaires des Cétacées. Avec 2 pl. in 8°. 88 pp. Paris, 1834, Deville-Cavellin."

Not seen; title from Carus and Engelmann. [818.]

1834. **Harlan, Richard.** Notice of Fossil Bones found in the Tertiary Formation of the State of Louisiana. <*Trans. Am. Phil. Soc.*, 2d ser., iv, 1834, pp. 397–403, pl. xx, figg. 1, 2.

First account of the Cetacean (then supposed to be Saurian) genus *Basilosaurus*. *Basilosaurus* gen. n., p. 403. Pl. xx, vertebra, fragment of jaw, etc. [819.]

1834. **Harlan, Richard.** Critical notices of various organic remains hitherto discovered in North America. <*Trans. Geol. Soc. Pennsylvania*, i, pt. i, Aug., 1834, pp. 46–112.

"Order *Cetacea*," pp. 73–75. Genus *Manatus*, p. 73. "Cetacea proper," pp. 74, 75. Remains of Spermaceti Whale from an estuary at mouth of Mississippi River=*Megistosaurus*, Godman, Ms. *Neophrosteon*, Raffinesque, affirmed to have been founded on an epiphysis of a Whale vertebra, p. 75. [820.]

1834. **Harlan, R.** Critical Notices of various Organic Remains hitherto discovered in North America. <*Edinb. New Philos. Journ.*, xvii, 1834, pp. 342–362, xviii, pp. 28–40.

Order *Cetacea*, xvii, pp. 361, 362. Genus *Basilosaurus*, xviii, pp. 29–31.
From advance sheets of the *Trans. Geol. Soc. Penn.*, i, pt. 1, 1834, *q. v.* [821.]

1834. **Knox, Robert.** Observations on the Anatomy of the Rorqual (a Whalebone Whale of the largest magnitude), drawn up from the dissection of a specimen found dead off North Berwick. <*Edinb. New Philos. Journ.*, xvi, 1834, pp. 181, 182.

Abstract of a paper having this title read before the Royal Society of Edinburgh, March 18, 1833. [822.]

1834. **Le Maoût, [E.]** [Détails relatifs aux vingt-neuf Dauphins (*Delphinus globiceps*) échoués sur les côtes de Bretagne.] <*L'Institut*, 2e ann., no. 43, 8 mars 1844, pp. 77, 78.

Voyez aussi *op. cit.*, pp. 95, 102, 117. [823.]

1834. **Le Maoût, [E.]** [Sur les Dauphins (*D. globiceps*) échoués sur les sillons de Talbert.] <*L'Institut*, 2e ann., no. 46, 29 mars 1844, p. 102.

Sur la vérification des observations. [824.]

1834. **Milne-Edwards, H.** *See* 1834. **Edwards, H. Milne.**

1834. "**D'Orbigny, A.** Notice sur un nouveau genre de Cétacé, des rivières du centre de l'Amérique Méridionale. Avec une planche. Paris, 1834. Jules Didot l'aîné. 4°. pp. 9."

Not seen; title at second hand. [825.]

1834. **D'Orbigny, A.** Nouveau genre de Cétacé. <*L'Institut*, 2 ann., no. 62, 19 juillet 1834, p. 240.

Inia Boliviensis, D'Orb. [826.]

1834. **Rédacteurs.** [Observations sur l'anatomie du Rorqual par M. Robert Knox.] <*L'Institut*, 2e ann., no. 61, 12 juillet 1834, p. 224.

Résumé. [827.]

1834. **Rédacteurs.** [Rapport sur le dissection d'un jeune Rorqual (*Balæna rostrata*), accompagné de quelques observations sur l'anatomie d'un fœtus de *Mysticetus*, par le Dr. Knox.] <*L'Institut*, 2e ann., no. 74, 11 octr. 1834, p. 336.

Résumé. [828.]

1834. **Roussel de Vauzème.** Note sur les Polypes qu'on trouve sur les fanons des Baleines. <*Ann. des Sci. nat.*, 2 sér., Zool., i, 1834, 331–333, pl. ix. [829.]

1834. R[o]ussel de Vauzème. Ueber die an den Barten der Walfische vorkommenden Polypen. <*Froriep's Notizen*, xliii, no. 925, Dec. 1834, pp. 5–7, figg. 3A–7A. [830.]

1834. Roussel de Vauzème. Anatomie d'un fœtus de Baleine. <*L'Institut*, 2ᵉ ann., no. 69, 6 sept. 1834, pp. 289, 290. [831.]

1834. Roussel de Vauzème. Recherches anatomiques sur un fœtus de Balaine. <*Ann. des Sci. nat.*, 2ᵉ sér., ii, Zool., 1834, pp. 125–127.

Extrait du *Journ. de l'Institut.* [832.]

1834. Saint-Hilaire, Geoffroy. Lecture des anciens en ce qui touche la naissance et la première éducation des Cétacés. <*L'Institut*, 2ᵉ ann., no. 40, 15 févr. 1834, p. 54.

Résumé. [833.]

1834. Saint-Hilaire, Geoffroy. Anatomie des glandes mammaires d'un marsouin, observée sur un sujet venu de Honfleur. <*L'Institut*, 2ᵉ ann., no. 45, 22 mars 1844, pp. 95, 96.

Avec discussion au sujet par MM. de Blainville, M. de Serres et G. St.-Hilaire. [834.]

1834. Saint-Hilaire, Geoffroy. Traité physiologique où l'on considère l'emploi des diverses parties des glandes mammaires des Cétacés. <*L'Institut*, 2ᵉ ann., no. 46, 29 mars 1844, pp. 102, 103. [835.]

1834. Saint-Hilaire, Geoffroy. Mémoire sur les glandes mammellaires pour établir que les Cétacés n'allaitent point comme à l'ordinaire leurs petits, et qu'ils pourraient s'en tenir à les nourrir de mucus hydraté! <*Ann. des Sci. nat.*, 2ᵉ sér., i, Zool., 1834, pp. 174–188. [836.]

1834. Saint-Hilaire, Geoffroy. Extrait de deux écrits sur la lactation des Cétacés. <*Ann. des Sci. nat.*, 2ᵉ sér., Zool., 1834, pp. 188–192. [837.]

1834. Serres, [M. de], *et* Bourjot Saint-Hilaire. Considérations sur le nerf facial et sur son influence dans l'acte de la respiration chez le Marsouin. <*L'Institut*, 2ᵉ ann., no. 76, 25 oct. 1834, pp. 347, 348. [838.]

1834. Shepard, Charles U. Geological observations upon Alabama, Georgia and Florida. <*Amer. Journ. Sci. and Arts*, xxv, 1834, pp. 162–173.

Mention of fragments of teeth and bones of *Manatus americanus* from Suannee Spring in Florida, p. 164. [839.]

1834. Traill, [T. S.]. On some of the Cetacea. <*Edinb. New Phil. Journ.*, xvii, 1834, pp. 177–180.

On the questions, "1. Have the Cetacea *mammæ?* 2. If they have, do they secrete milk? 3. Have they a nipple? And, 4. Do the young derive their nourishment from the teats?" in reference to the positions taken by von Baër and Geoffroy St.-Hilaire. Dr. Traill answers these questions affirmatively, adducing proofs. He also gives measurements of his "*Delphinus Deductor*" from the manuscript notes of Mr. James Watson, corrects a misprint in the measurements given by him in his original description of the species, and affirms that the *Delphinus globiceps* of "the French *savans*" is only his "*D. Deductor*." There is also a correction of the measurements of *Balæna Rostrata* given by Scoresby (*Arct. Reg.*) from Watson's notes. [840.]

1834. [Williams, J. R.] The Whale Fishery. <*North Amer. Rev.*, xxxviii, 1834, pp. 84–115.

Devoted mainly (pp. 94–115) to a general history of the American Whale Fishery. [841.]

1835. Baer, K. E. v. Über das Gefäss-system des Braunfisches. <*Nova Acta Phys.-med. Acad. Cæs. Leop.-Carol. Nat. Curios.*, xvii, p. i, 1835, pp. 394–408, pl. xxix. [842.]

1835. "Beale, Thomas. A few Observations on the Natural History of the Sperm Whale, with an account of the rise and progress of the Fishery and of the modes of pursuing, killing and cutting that animal. London, 1835. 8°."

Not seen. [843.]

1835. Christol, Jules de. Comparaison de la population contemporaine des Mammifères de deux bassins tertiaires du département de l'Hérault. <*Ann. des Sci. nat.*, 2ᵉ sér., iv, Zool., 1835, pp. 193–238.

Mammifères marins, pp. 216–220. Lamantin, p. 216. [844.]

1835. Duméril, [A. M. C.]. [Sur une lettre par M. Lepiez dans laquelle il donnait les détails anatomiques d'une Marsouin femelle.] <*L'Institut*, 3e ann., no. 92, 11 févr. 1835, pp. 46, 47. [845.]

1835. Duvernoy, [G. L.]. Tableaux des ordres, des familles et des genres de Mammifères, adoptés pour le cours de zoologie de la Faculté des Sciences. <*Mém. de la Soc. du Mus. d'Hist. nat. de Strasbourg*, ii, 1835, Mém. K K, 10 pp., avec 5 feuilles grosses.

Ordre xiv. *Amphibies trirèmes.*	Fam. des *Lamantins*	*Manatus*	*M. americanus.*
		Halicore	*H. dugung.*
		Rytina	[*R.*] *borealis.*
Ordre xv. *Cétacés*	1re Famille. *Les Dauphines.*	*Delphinus*	*D. delphis.*
		Delphinorhynque	*D. micropterus.*
		Inia	*I. boliviensis.*
		Phocæna	*P. communis.*
		Hyperoodon	*H. Butzkopf.*
		Monodon	*M. monoceros.*
		Platanista	*P. gangeticus.*
	2e Famille. *Les Cachalots* . .	*Physeter*	*P. macrocephalus.*
	3e Famille *Les Baleines*	*Balæna*	*B. mysticetus.*
		Rorqual	*R. Boops.*

[846.]

1835. Duvernoy, G. L. Plusieurs notes sur quelques ossemens fossiles de l'Alsace et du Jura. <*Mém. de la Soc. du Mus. d'Hist. nat. de Strasbourg*, ii, 1835, Mém. E E, pp. 12, avec 1 pl.

I. Sur un *Cétacé fossile*, voisin des *Dugongs* et des *Lamantins*, trouvé à Rœdersdorf, dans le Département du Haut-Rhin, pp. 1–9, figg. 1, 2. [847.]

1835. Duvernoy, [G. L.]. [Sur le squelette d'un Cétacé fossile découvert dans une carrière de Rœdersdorf, village du département du Haut-Rhin.] <*L'Institut*, 3e ann., no. 126, 7 oct. 1835, pp. 326, 327.

Its affinities, not fully determined by the author, appear to be Sirenian. [848.]

1835. Editors. Descriptive Catalogue of the Preparations in the Anatomical Department of the Museum of the Royal College of Surgeons in Ireland. <*Edinb. New Philos. Journ.*, xviii, 1835, pp. 369–372.

Extracts from Dr. Houston's "Descriptive Catalogue of the Preparations in the Anatomical Department of the Royal College of Surgeons of Ireland," here taken from the *Dublin Journ. of Med. and Chem. Science*, vi, no. xviii, p. 435, respecting the respiration of diving animals, as exemplified in the Cetacea, Seals, the Otter, etc. [849.]

1835. Gerv. [=Paul Gervais.] Dugong, *Halicore*. <*Dict. pittor. d'Hist. nat. et des Phénom. de la Nature*, ii, 1836, livr. clv, pp. 595–596.

Halicore indicus. [850.]

1835. Gerv. [=Paul Gervais.] Dauphin, *Delphinus*. <*Dict. pittor. d'Hist. nat. et des Phénom. de la Nature*, ii, 1835, livrr. lx, lxi, pp. 477–483.

[Observations générales], pp. 477–479. [Espèces]: **1.** *Delphinus* (*Delphinorhynchus*) *Geoffroyi*, p. 479; **2.** *D.* (*D.*) *coronatus*, p. 479; **3.** *D.* (*D.*) *gangeticus*, p. 479; **4.** *D.* (*D.*) *pernettensis*, p. 479; **5.** *Delphinus Boryi*, p. 479; **6.** *D. delphis*, p. 480, pl. cxxxv, fig. 9; **7.** *D. sinensis*, p. 480; **8.** *D. dubius*, p. 480; **9.** *D. tursio*, p. 480; **10.** *D. Bayeri*, p. 480; **11.** *D. orca*, p. 480; **12.** *D.* (*Oxypterus*) *mongitori*, p. 481; **13.** *D.* (*O.*) *rhinoceros*, p. 481; **14.** *D.* (*Platanista*) *rostratus* Shaw (*D. gangeticus*, Lebeck), p. 481; **15.** *D.* (*Inia*) *bolivensis*, p. 481; **16.** *D.* (*Phocæna*) *phocæna*, p. 481; **17.** *D.* (*Ph.*) *grampus*, p. 482; **18.** *D.* (*Ph.*) *rissoanus*, p. 482; **19.** *D.* (*Delphinapterus*) *leucas*, p. 482, (voy. aussi, tome i, p. 425); **20.** *D.* (*D.*) *senedetta*, p. 482; **21.** *D.* (*D.*) *Peronii*, p. 482; **22.** *D.* (*Heterodon*) *ananarcus*, p. 482; **23.** *D.* (*H.*) *Hunteri*, p. 482; **24.** *D.* (*H.*) *edentulus*, p. 482; **25.** *D.* (*H.*) *butskopf*, p. 483; **26.** *D.* (*H.*) *sowerbensis*, p. 483. [851.]

1835. Harlan, R[ichard]. Medical | and | Physical Researches: | or | original memoirs | in | medicine, surgery, physiology, geology, zoology, and | comparative anatomy. | Illustrated with plates, containing 160 figures. | — | By R. Harlan, M. D., F. L. S. Lond., | . . . [=titles, 12 lines.] | — | . . . [=quotation, 6 lines.] | — | Philadelphia: | Printed by Lydia R. Bailey, | No. 26 North Fifth Street. | 1835. 8°. pp. i–xxxix, 9–653, l. 1, pll. (unnumbered).

1. Description of a new Species of Manatus, or Sea Cow [*Manatus latirostris*], inhabiting the coast of East Florida, pp. 68–71, pl. —, fig. 1, skull in profile; fig. 2, lower jaw; fig. 3, an-

1835. HARLAN, R[ICHARD]—Continued.
terior portion of skull from above; fig. 4, do. of *Manatus senegalensis;* fig. 5, do. of *M. americanus*, auct.

2. Description of the *Delphinus intermedius*—a new Species of Grampus, inhabiting the Coast of New England, pp. 72, 73, fig. of animal.

3. Observations on a large Skeleton recently disinterred from the mouth of the Mississippi River, pp. 76, 77. Identified as *Physeter macrocephalus*.

4. Revised Catalogue of the Mammiferous Animals of North America, pp. 78–83. Order *Cetacea:* First family, *Sirenia*, or Herbivorous Whales, spp. 2 (*Manatus latirostris*, *Stellerus borealis*); second family, Whales proper, genn. 4, spp. 14.

5. Critical Notices of various Organic Remains hitherto discovered in North America, pp. 253–313. Order *Cetacea*, pp. 278–280 (fossil remains of Manatee and Spermaceti Whale). Genus *Basilosaurus*, Harlan, pp. 282–283.

6. Observations on the Fossil Bones [of *Basilosaurus*] found in the Tertiary Formation in the State of Louisiana. Originally communicated to the American Philosophical Society, pp. 337–343. [852.]

1835. HARLAN, RICHARD. [Announcement of the discovery of *Basilosaurus.*] <*Bull. Soc. géol. de France*, iv (1833, 1834), 1835, p. 124.
Ten lines,—abstract of a verbal communication. [853.]

1835. HARLAN, RICHARD. Description of the remains of the Basilosaurus, a large fossil marine animal, recently discovered in the horizontal limestone of Alabama. <*Trans. Geol. Soc. Penn.*, i, 1835, pp. 348–357, pll. xxii–xxiv.
Cetacea "proper," pp. 74, 75. "The 'New Fossil Genus' of Rafinesque, named '*Nephrosteon*,' (*Vid.* Atlantic Journal), and the bone on which the genus is constructed . . . has no other foundation than one of these epiphyses from the remains of a recent spermaceti whale," p. 75. *Basilosaurus*, pp. 77–80, pll. xxii–xxiv. *Plesiosaurus* (=*Priscodelphinus*, Leidy), p. 77. [854.]

1835. HERAUSGEBER. Knox, besonderer Bau im 2ten Magen gewisser Wale. . . . <*Isis von Oken*, 1835, pp. 302, 303.
Auszug aus dem *Edinburgh Journ. Sci.*, iii, 1830, pp. 325–388. [855.]

1835. HERAUSGEBER. Alderson, über einen männlichen Walrath-Wal, der Ende April 1825 an die Küste von Yorkshire geworfen wurde. <*Isis von Oken*, 1835, pp. 1006–1008.
Auszug aus *Trans. Cambridge Phil. Soc.*, i, 1822, pp. 253–266, pll. xii–xiv. [856.]

1835. HERAUSGEBER. Harlan: über einige neue Arten fossiler Saurier (*Bull géol.*, 1833, iv, 124). <*Neues Jahrb. für Mineral.*, 1835, p. 737.
Basilosaurus. [857.]

1835. HERAUSGEBER. Knox, über die Knochen und das Zahen des Dugongs. <*Isis von Oken*, 1835, p. 290.
Auszug aus dem *Edinburgh Journ. Sci.*, i, 1829, pp. 157, 158. [858.]

1835. HERAUSGEBER. Einige Beobachtungen über die Naturgeschichte des Pottfisches, ec. Vom Chirurgen T. Beale. <*Froriep's Notizen*, xliv, No. 961, Mai 1835, pp. 230–232.
Uebersetzung aus "*The Literary Gazette.*" [859.]

1835. KAUP, J. J. Das | Thierreich | in seinen Hauptformen | systematisch beschrieben | von | Dr. J. J. Kaup, | Mitglied der K. K. Leopoldinischen Akademie in Bonn, der naturforschenden Gesellschaften in Moskau, Zürich, Mannheim etc. | — | [Mit in den Text eingedruckten | Abbildungen | von | L. Becker und Ch. Schüler, | unter Mitwirkung | von | Wilhelm Pfnor. | — | Drei Bände.] Erster Band. | Naturgeschichte der Menschen und der Säugethiere. | Mit 180 in den Text eingedruckten Abbildungen. | — | Darmstadt, 1835. | Verlag von Johann Philipp Diehl. 8°. ll. 2, pp. i–xxxv, 1–452, l. 1.

Vierter Stamm. Dritte Ordnung. Delphine. Cetacea (incl.), pp. 372–376. **1.** *Monodon Monoceros*, p. 373, fig.; **2.** *Delphinapterus leucas*, p. 375; **3.** *Phocaena vulgaris*, p. 375; **4.** *Ph. Orca*, p. 375; **5.** *Delphinus Delphis*, p. 576.

Fünfter Stamm. Zweite Ordnung. Pflanzenfressende Walthiere. Cetacea herbivora, *Sirenia*, pp. 426–430. **1.** *Halicore Dugong*, p. 428, fig.; **2.** *Manatus americanus*, p. 429; **3.** *Rytina Stelleri*, p. 430.

Fünfter Stamm. Dritte Ordnung. Wale. *Hydraula*, pp. 431–445. **1.** *Physeter macrocephalus*, p. 433, fig.; **2.** *Balaena Mysticetus*, pp. 434–445, fig.; **3.** *B. Physalus*, p. 445.

Phocæna vulgaris, nom. sp. n., p. 373. [860.]

1835. Knox, [R.]. Account of the Dissection of a Young Rorqual, or Short Whalebone Whale, (the Balæna Rostrata of Fabricius); with a few Observations on the Anatomy of the Fœtal Mysticetus. <*Edinb. New Philos. Journ.*, xviii, 1835, pp. 197–199.

Abstract of a paper read at the meeting of the Royal Soc. Edinb., April 21, 1834. [861.]

1835. Knox, Robert. Section eines jungen Nordkapers (*Balaena rostrata*, Fabr.), nebst anatomischen Beobachtungen rücksichtlich eines Fötus der *B. Mysticetus*. <*Froriep's Notizen*, xliii, No. 935, Feb. 1835, pp. 164–165.

Aus *L'Institut*, no. 74, 11. Oct. 1834. [862.]

1835. Küster, H. C. Beyträge zur Naturgeschichte der Insel Sardinien. <*Isis von Oken*, 1835, pp. 75–85.

Cetacea, p. 85 (*Delphinus phocaena*). [863.]

1835. Küster, H. C. Beobachtungen über das Wasserausspritzen der Cetaceen. <*Isis von Oken*, 1835, pp. 85–87. [864.]

1835. Lenz, H. O. Gemeinnützige | Naturgeschichte, | von | Dr. Harald Othmar Lenz, | Lehrer an der Erziehungsanstalt zu Schnepfenthal. | — | Erster Band: Säugethiere. | Mit Acht Tafeln Abbildungen. | — | Gotha, | Beckersche Buchhandlung. | 1835. 8°. pp. i–vi, 1–450, pll. i–viii.

Neunte Ordnung der Säugethiere. Fischsäugethiere, *Cetacea*, pp. 426–440, pl. vii, figg. 59–62.

Erste Familie . . . *Herbivora* (=*Sirenia*): **1.** *Manatus australis*, p. 427; **2.** *M. senegalensis*, p. 427; **3.** *Halicore cetacea*, p. 428; **4.** *Rhytina Stelleri*, p. 428.

Zweite Familie . . . *Hydraula* (=*Cetacea*): **1.** *Delphinus Delphis*, p. 428, fig. 59; **2.** *D. Tursio*, p. 429; **3.** *D. Phocæna*, p. 429; **4.** *D. Orca*, p. 429; **5.** *Monodon monoceros*, p. 430, fig. 60; **6.** *Physeter macrocephalus*, p. 432, fig. 61; **7.** *Balæna Mysticetus*, p. 433, fig. 62; **8.** *B. Physalus*, p. 440; **9.** *B. rostrata*, p. 440. [865.]

1835. Lepiez. *See suprà*, 1835. Dumérel, in *L'Institut*, 1835, no. 92, pp. 46, 47.

1835. Macy, O. The | History of Nantucket; | being a compendious Account of the first | Settlement of the Island by the English, | together with the | Rise and Progress | of the | Whale Fishery; | and other historical facts relative to said | Island and its Inhabitants. | In Two Parts. | — | By Obed Macy. | — | . . . [=quotation, 3 lines.] | Boston: | Hilliard, Gray, and Co. | — | 1835. 8°. pp. i–xi, 1–300, map and cut.

Whales and the Whale Fishery are noticed *passim* in Part I, as follows: pp. 27–33, 36–38, 50–55, 68–72, 110–117, 119–134, 137–145, 149–151, 154–172, 208–216. Adventures of two whalemen (Part II), pp. 219–221. Description of the outfit and cruise of a Sperm Whale ship, pp. 221–228. The Right Whale, p. 229. Description of a sixty-barrel Sperm Whale, pp. 229–232, pl. (Physeter or Spermaceti Whale, copied from Colnett's "Voy. to South Atlantic and Pacific Ocean" (18 , *q. v.*). Progress of the Whale Fishery at Nantucket, pp. 232–234 ("from the *Historical Society's Collection*"). Produce of the Whale Fishery carried on at Nantucket, between the years 1804 and 1834, inclusive, p. 235 (statistical table). Accounts of the loss of various whaling ships, pp. 236–253. Proposal from the French government to the people of Nantucket to remove to Dunkirk, pp. 253–259. [866.]

1835. Mulder, Claas. Over de tanden van den Narwal of Eenhoorn (*Monodon Monoceros L.*). <*Van der Hoeven en de Vriese's Tijdsch. voor Natuurl. Gesch. en Phys.*, ii, 1835, pp. 65–100, pl. ii.

The number, development, and functions of the teeth, treated historically and critically. "Bij het ontleden van mijne meergemelmelde voorwerpen, heb ik weerzijds in de bovenkaak eenen tand ontdekt, zoodat daardoor de analogie van Narwal met Dolfijnen versterkt, de overgang geleidelijker wordt" (pp. 107, 108).

The plate gives figures of the tusks and back teeth of a fœtal and an adult specimen, and of the tusk, with sections of the latter. [867.]

1835. Piez. [=Lepiez.] Ueber ein Meerschweinweibchen (*Delphinus phocaena*). <*Froriep's Notizen*, xliii, No. 940, pp. 243, 244.

Anatomische Bemerkungen. Aus *l'Institut*, 3^e ann., 1835, pp. 46, 47. (*See* 1835. Duméril.) [868.]

1835. Reid, John. Einige Beobachtungen rücksichtlich der Structur der Gekrösdrüsen bei *Balaenoptera rostrata*. <*Froriep's Notizen*, xliii, No. 938, Feb. 1835, pp. 209–211.

Aus *Edinb. Med. and Surg. Journ.*, No. cxxii, Jan. 1, 1835. [869.]

1835. **Ross, J. C.** Appendix | to the | Narrative | of a | Second Voyage in search | of a | North-west Passage, | and of a | Residence in the Arctic regions | during the years 1829, 1830, 1831, 1832, 1833. | By | Sir John Ross, C. B., K. S. A., K. C. S., &c. &c. | Captain in the Royal Navy. | Including the reports of | Commander, now Captain, James Clark Ross, R. N., F. R. S., F. L. S., &c. | and | the discovery of the northern magnetic pole. | — | London: | A. W. Webster, 156, Regent street. | — | 1835. 4to. pp. i–xii, 1–120, i–ciii, pll.

Zoology, by James Clark Ross, pp. vii–c.

Delphinapterus Beluga, p. xxii; *Monodon Monoceros*, p. xxii; *Balæna Mysticetus*, pp. xxiii, xxiv. There are valuable notes regarding the last two. [870.]

1835. **Sharpey, [W.].** Observations on the Anatomy of the Bloodvessels of the Porpoise. <*Rep. Brit. Ass. Adv. Sci.*, 4th meeting, Edinburgh, 1834 (1835), pp. 682, 683. [871.]

1835. **Swainson, W.** The | Cabinet Cyclopædia. | Conducted by the | Rev. Dionysius Lardner, LL. D. F. R. S. L. & E. | M. R. I. A. F. R. A. S. F. L. S. F. Z. S. Hon. F. C. P. C. &c. &c. | assisted by Eminent Literary and Scientific Men. | — | Natural History. | — | A Treatise | on | the Geography and Classification | of | Animals. | By | William Swainson, Esq. A. C. G. | Honorary Member of the Cambridge Philosophical Society, | and of several Foreign Academies. | — | London: | Printed for Longman, Rees, Orme, Brown, Green, & Longman, | Paternoster-Row; | and John Taylor, | Upper Gower Street. | 1835. 8°. pp. i–vii, 1–367, l. 1.

Part II. On the Rise and Progress of Systematic Zoölogy (pp. 122–223), treats of the principal systems of classification, with critical remarks thereon from the quinarian standpoint. [872.]

1835. **Thacher, James.** History | of | the Town of Plymouth, [Mass.] | from its first Settlement in 1620, | to the present time: | with a concise | History of the Aborigines | of New England, | and their Wars with the English, &c. | By James Thacher, M. D. A. A. S. | "Ask thy fathers and they will show thee; thy elders and they will tell | thee." | Second Edition, enlarged and corrected. | — | Boston: | Marsh, Copen & Lyon. | 1835. 8°. pp. i–iv, 1–16+13–401, map.

Whales in Plymouth Bay, p. 21. Whale Fishery, pp. 317, 318.

For first ed. see 1832. [873.]

1835. **Tilesius, [G. W.].** Die Wallfische. <*Isis von Oken*, 1835, pp. 709–752, 801–828.

Cete herbivora, pp. 709–719.

[Aechten Cetaceen], pp. 719–752, 801–828. Spec. 1. Der weisse Delphin aus Canada, p. 721; Sp. 2. *D. coronatus* Fréminville, p. 721; Sp. 3. *D. bredanensis* Cuv., p. 721; Sp. 4. *D. macrogenius* [Cuv.], eine fossile *Species*, p. 721; Sp. 5. *D. gangeticus* Lebeck, p. 721; Sp. 6. *D. boryi*, p. 722; Sp. 7. *Delphinus delphis* Linn., p. 722; Sp. 8. *D. cruciger*, p. 722; Sp. 9. *D. maculatus* Lesson et Garnot, p. 722; Sp. 10. *D. dubius* Cuv., p. 722; Sp. 11. *D. Tursio* Fabricii, p. 722; Sp. 12. *D. niger* Lacép., p. 723; Sp. 13. *D. malayanus* Lesson et Garnot, p. 723; Sp. 14. *D. lunatus* Less. et Garn., p. 724; Sp. 15. *D. minimus* Less. et Garn., p. 724; * *D. Bertini* Desm., p. 724; * *D. Mongitori* Desm., p. 724; Sp. 16. *D. monoceros*, *Rhinoceros* Quoy et Gaimard, p. 724; Sp. 17. *D. Phocaena* Linn., p. 724; Sp. 18. *D. leucocephalus* Less. et Garn., p. 724; Sp. 19. *D. bivittatus* Less. et Garn., p. 724; Sp. 20. *D. superciliosus* Less. et Garn., p. 725; Sp. 21. *D. orca* Fabric., p. 725; * *D. intermedius* Gray, p. 726; Sp. 22. *D. griseus* Cuv., p. 726; * *D. rissoanus*, p. 726; Sp. 23. *D. globiceps* Cuv., p. 726; Sp. 24. *D. cortesii*, p. 726; * *D. feres*, p. 726; Sp. 25. *D. leucas* Pallas, p. 728; Sp. 26. *D. Peronii* Lacép., p. 730; * *D. Kingii* Gray, p. 730; Sp. 27. *D. dalei*, p. 730; Sp. 28. *D. hyperoodon* Desm., p. 731; Sp. 29. *D.? spurius*, p. 731; * *D. Epiodon* Desmar., p. 731; *Monodon monoceros* Linn., p. 781; *Monodon microcephalus* Lacép., p. 734; *Monodon Andersonianus* Lacép., p. 734.

Thiere, deren Kopf sehr gross und voluminös ist und daher mit dem Körper in keinem Verhältnisse steht. A. *Physeteres*, Blaser. 1) *Cachalot* Lacép. Cetac. *Catodon*, p. 735; 2) *Ziphius cavirostris*, p. 735; 3) *Catodon macrocephalus*, pp. 736–739; 4) *Der Trumpo der Bermuden* Brown, p. 739; 5) *Catodon polycyphus*, p. 739; 6) *Catodon suineval*, p. 739; 7) *Physalus cylindricus* Lacép., p. 740; 8) *Physeter microps* Lacép., p. 740; Die zweyte Art der Caschelote [*Physeter microps*], pp. 740–743; Die dritte Species der Caschelote [*Ph. tursio* Linn.], p. 743; Die vierte Species der Caschelote, p. 744. *Ambra grisea*, Ambergriès der Kaufleute, pp. 745–747. Vom Walrath oder *Sperma ceti* der Kaufleute und Apotheker, pp. 747–751.

Von den eigentlichen Walfischen mit Barten, pp. 801–820. Der gemeine grönländische

1835. TILESIUS, [G. W.]—Continued.

Walfisch, *Balaena mysticetus* Linn., pp. 801–807; Die zweite Species, der Finnfisch (*Balaena physalus* Linn.), pp. 807–810; 3. Spec., *Balaena Boops*, pp. 810–813; 4. Spec., Der Nordkaper, *Balaena musculus*, pp. 814–816; 5. Spec., Schnabelfisch, *Balaena rostrata*, pp. 816–819; 9) *Physeter orthodon* Lacép., p. 819; 10) *Physeter mular* Lacép., p. 820; 11) *Physeter sulcatus* Lacép, p. 820.

Balaenae. Eigentliche Walfische mit Barten in den Kieferbeinen. . . . A. Walfische ohne Rückenflossen und ohne Buckel. 12) *Balaena mysticetus* Linn., p. 820; 13) *Balaena glacialis* Klein, p. 821. B. Walfische, die einen oder meherer Buckel auf dem Rücken haben. 14) *Balaena nodosa* Bonnaterre, p. 821; 15) *Balaena gibbosa* Bonnaterre, p. 821; 17) *Balaena lunulata*, p. 821. Die Gattung *Balaenoptera* des Lacépède führt eine Rückenflosse. A. Keine Falten (?) weder unter dem Bauche noch unter Kehle. 18) *Balaenoptera gibbar* Lacép., p. 822. B. Walfische mit Falten, die unter dem Bauche und der Kehle der Länge nach fortlaufen. 19) *Balaenoptera jubarte* Lesson, p. 822; 20) *Balaenoptera acuto-rostrata* Lacép., p. 822; 21) *Balaenoptera musculus* Pallas, p. 822; 22) *Balaenoptera punctata* Lacép., p. 823; 23) *Balaenoptera nigra* Lacép., p. 823; 24) *Balaenoptera coerulescens* Lacép., p. 823; 25) *Balaenoptera maculata* Lacép., p. 823.

Pallas russische Walfische oder Cetaceen [6 spp.], pp. 824–826 [and the following:] B. Die Blaser, *Physeteres*. Springer, pp. 826–827; C. *Ancylodon* Illiger. Lesson Man. de Mammal., pag. 432, p. 827; D. Delphin, p. 828.

Of the many bad pieces of cetological composition there are few more worthless, viewed from the stand-point of to-day, than this pretentious compilation of some fifty closely printed pages of Oken's *Isis*; even Lacépède's and Chamisso's baseless species, described respectively from Japanese drawings and Aleut carvings in wood, to say nothing of many other purely nominal species, being here formally introduced. The literal transcription of the sub-headings and specific names above given renders further comment needless. [874.]

1835–36. CUVIER, F. Cetacea. <*Todd's Cyclopædia of Anatomy and Physiology*, vol. i, 1835–36, pp. 562–594, figg. 246–279.

At the end of the paragraph giving the "Bibliography" occurs the following: "(The preceding article has been derived from the work last named in the Bibliography, with the addition of the extracts from Mr. Hunter's papers and the other passages between brackets.)" The work "last named" here referred to is "*Cuvier, Fr.* Histoire naturelle des Cétacés, 8vo. Paris, 1836." The bracketed passages not from Hunter, giving the classification and characters of the group (pp. 562–564), and some other passages, are presumably by the editor, Dr. Robert B. Todd.

Tribe I. *Phytophaga: Manatus* (2 spp.), *Halicore* (2 spp.), *Rytina* (1 sp.).

Tribe II. *Zoophaga:* Family *Delphinidæ*, with genn. *Delphinorhynchus*, *Delphinus*, *Inia*, *Phocæna*, *Monodon*, *Hyperoodon*, *Platanista*. Family *Catodontidæ*, with genn. *Catodon*, *Physeter*. Family *Balænidæ*, with genn. *Balænoptera*, *Balæna*.

The *Zoophaga* are divided into two groups, A and B, group A consisting of the *Delphinidæ*, and group B of the *Catodontidæ* and *Balænidæ*. [875.]

1835–39. JÄGER, G. F. Ueber die | Fossilen Säugethiere | welche | in | Würtemberg | aufgefunden worden sind | von | Med. Dr. Georg Fried. Jäger, | . . . [=titles, 8 lines.] | [Erste Abtheilung.] | — | Stuttgart, | Bei Carl Erhard. | 1835.

[Oder] Über die | Fossilen Säugethiere, | welche | in | Würtemberg | in verschiedenen Formationen | aufgefunden worden sind, | nebst | geognostischen Bemerkungen über diese Formationen | von | Med. Dr. Georg Fried. Jäger | . . . [=titles, 11 lines.] | [Zweite Abtheilung.] | — | Stuttgart, | Bei Carl Erhard. | 1839. 2°. Abth. I, ll. 3, pp. 1–70, l. 1, pll. i–ix. Abth. II, ll. 2, pp. 71–212, l. 1, pll. x–xx.

[N. B.—In "Bermerkung für den Buchbinder," affixed to the wrapper of Abth. II, the author directs the second of the above-given titles (which is that of Abth. II) to be used in binding as that of the completed work.]

Dedication to George Cuvier, l. 3; Vorrede, l. 4; Vorwort zu der Zweiten Abtheilung, l. 5, erste Seite; Inhalts-Anzeige, l. 5, zweite Seite; Einleitung, pp. 1, 2; I. Die Ueberreste von Säugethieren aus der Molasse Oberschwabens, pp. 3–10, 71. II. Die Ueberreste von Säugethieren aus den Bohnerzgruben der schwäbischen Alb, pp. 11–59, 71–79. III. Die Ueberreste von Säugethieren aus dem Süsswasserkalk bei Steinheim, pp. 59–70. IV. Die Ueberreste von Säugethieren in der Höhle bei Erpfingen, pp. 80–94. V. Ueberreste von Säugethieren aus der Schellershöhle bei Wittlingen, pp. 94–98. VI. Ueberreste von Säugethieren aus dem weicheren Kalktuffe der schwäbischen Alb und aus der in ihm gebildeten Höhle bei Seeburg, pp. 98–105. VII. Die Ueberreste von Säugethieren der Diluvial- und älteren Alluvial-Formation, pp. 105–182. VIII. Ueberreste von Säugethieren im Torf, pp. 183–197. VII (*i. e.*, IX).

1835–39. JÄGER, G. F.—Continued.

Ueberreste von Säugethiere aus alten Grabhügeln und Gräbern, p. 197. VIII (*i. e.*, X). Die Ueberreste von Säugethiere in dem neueren Alluvialboden, pp. 197–200. Resultate, pp. 200–212. Erklärung der Tafeln und Druckfehler, 1 l.

Cetaceën, pp. 4–7. Figg.: pl. i, figg. 4–28, spp. incog., aus der Molasse; pl. ix, figg. 1–6, Cetaceum (sp. incog.), aus der Molasse.

The remains of Cetaceans here described and figured are not definitely referred to either species or genus, though some are thought to be referable to *Ziphius*, others to *Physeter*, *Delphinus*, etc. [876.]

1835–44. "BEALE, THOMAS. The Natural History of the Sperm Whale and a Sketch of a South-Sea Whaling Voyage. London, J. van Voorst, 1835–44. 8°."

Not seen; title at second hand. [877.]

1836. BAER, CAROLO ERN. A. Delphini Phocaenae anatomes sectio prima. <*Bull. sci. de l'Acad. imp. des Sci. de St.-Pétersbourg*, i, 1836, pp. 26–28.

Extrait en langue français du mémoire de cet titre publié dans les *Mém. de l'Acad. imp. de St.-Pétersb.* [878.]

1836. BAER, [C. E.] DE. Sur le prétendu passage de l'eau par les évents des Cétacés. <*Bull. sci. de l'Acad. imp. des Sci. de St.-Pétersbourg*, i, 1836, pp. 37–40.

Historique et critique. "Voilà, Messieurs, l'histoire d'une idée que je crois fausse, et que s'est conservée dans la zoologie par l'autorité des anciens, par la rareté de la connaissance de la langue allemande parmi les autres peuples qui cultivent les sciences, par l'empressement des Allemands à apprendre toutes les langues et à consulter la littérature de toute l'Europe, et par les mésententdus d'un traducteur." (p. 40.) [879.]

1836. BAER, [K. E.] VON. Ueber das Gefässsystem des Braunfisches (*Delphin. Phocaena*). <*Froriep's Notizen*, l, No. 1081, Sept. 1836, pp. 37–39, fig. 33. [880.]

1836. BENEDEN, [P. J.] VAN. Observations sur les caractères spécifiques des grands cétacés, tirés de la conformation de l'oreille osseuse. <*Ann. des Sci. nat.*, 2e sér., Zool., vi, 1836, pp. 158, 159. [881.]

1836. BENEDEN, [P. J.] VAN. Os de l'oreille considéré comme ayant une valeur caractéristique dans les Cétacés. <*L'Institut*, 4e sér., no. 177, 28 sept. 1836, p. 318. [882.]

1836. BENNETT, FREDERICK DEBELL. Notes on the Anatomy of the Spermaceti Whale (*Physeter macrocephalus*, Lac.). <*Proc. Zool. Soc. Lond.*, 1836, pp. 127–129.

Dentition, structure of the eye, etc. [883.]

1836. "BODEL NIJENHUIS, J. T. Over de walvischaardige dieren, op de kusten van Nederland van de vroegste tijden òf gestrand òf gevangen."

"Zie: Algem. konst en letterbode. 1836, i, bl. 153, 163, 331."

Not seen; title from Bosgoed, *op. cit.*, p. 158, no. 2500. [884.]

1836. "BRUNS, V. Disquisitiones de nervis Cetaceorum cerebralibus. Tübingen, 1836. 8°."

Not seen; title from Carus and Engelmann. [885.]

1836. CAUCHY, [F. P.]. [Rapport sur un os fossile trouvé à Tuyvenberg.] <*Bull. de l'Acad. roy. des Sci., etc., de Bruxelles*, iii, 1836, pp. 42, 43.

Remarques supplémentaires au rapport par M. le professeur Fohmann. (*Voyez* 1836. FOHMANN.) [886.]

1836. CUVIER, F. De l'Histoire | naturelle | des Cétaceés, | ou | Recueil et examen des Faits | dont se compose l'Histoire naturelle de ces Animaux; Par M. F. Cuvier, | de l'Académie des Sciences, de la société de Londres etc. | Paris. | Libraire encyclopédique de Roret, | Rue Hautefeuille, N° 10bis. | — | 1836. 8°. ll. 2, pp. i–lii, 1–416, pll. i–xxii.

Discours préliminaire. Considérations générales sur l'histoire naturelle des Cétacés, pp. i–lii.

Des Cétacés herbivores [*Sirenia*] en général, pp. 1–6.—Les Lamantins—*Manatus*, p. 6; **1.** *Manatus americanus*, pp. 7–21; **2.** *Manatus Senegalensis*, pp. 21–25; **3.** *Manatus latirostris*, pp. 25–26; Mesures comparatives des têtes des trois espèces de Lamantins, p. 27; Les Dugongs—*Halicore*, pp. 27, 28; **4.** *Halicore Indicus*, pp. 29–38, 375, 376, pll. iv, v, vi; *Rytina*, pp. 38–40; **5.** *Rytina borealis*, pp. 41–71, 376 (une traduction du mémoire de Steller, sans aucun retranchement), pp. 376, 377.

1836. Cuvier, F.—Continued.

Des Dauphins en général, pp. 73–113, 377; Les Delphinorhynques—*Delphinorhyncus*, pp. 113, 378; **1.** *D. micropterus* [Blainv.], pp. 114–117, pl. ix, fig. 1; **2.** *D. Coronatus* [Fréminv.], pp. 117–120; **3.** *D. Frontatus*, pp. 120–122; Les Dauphins proprement dits—*Delphinus*, pp. 122, 123, pl. x, fig. 1, skull; **4.** *D. delphis* [Linn.], pp. 123–142; **5.** *D. tursio* [Bonn.], pp. 142–147; **6.** *D. Capensis* [Gray], pp. 147–148; **7.** *D. superciliosus* [Less. et Garnot], pp. 148, 149: **8.** *D. novæ Zelandiæ* [Quoy et Gaim.], pp. 149, 150; **9.** *D. malayanus* [Less. et Garnot], pp. 150, 151; **10.** *D. plumbeus* [Dussum.], pp. 151–153; **11.** *D. dubius* [G. Cuv.], pp. 153, 154; **12.** *D. velox* [Dussum.], pp. 154, 155; **13.** *D. frænatus* [F. Cuv.], pp. 155, 156, pl. x, fig. 1; **14.** *D. rostatus* (*sic*), [G. Cuv.], pp. 156–158, pl. x, fig. 2; **15.** *D. cephalorhyncus* [sp. n. = *D. heavisidii*, Gray, 1828], pp. 158, 159; **16.** *D. Desmaresti* [Risso], pp. 159–161; **17.** *D. hastatus* [sp. n. = *D. heavisidii*, Gray, 1828], pp. 161, 162; **18.** *D. obscurus* [Gray], pp. 162–164; **19.** *D. Peronii* [Lacép.], pp. 164–166, pl. xv, fig. 2; Les Inias—*Inia*, pp. 166, 167; **20.** *J. Boliviensis* [D'Orb.], pp. 167–170, pl. x bis; Les Marsonins—*Phocæna*, pp. 170, 171; **21.** *P. communis* [Linn.], pp. 171–177; **22.** *P. orca* [Wagl.], pp. 177–182; **23.** *P. griseus* [Less.], pp. 182–186; **24.** *P. compressi caudata* [Less.], pp. 186–190; **25.** *P. globiceps* [G. Cuv.], pp. 190–196, 379; **26.** *P. rissonnus* (*sic*), [G. Cuv.], pp. 196–199, pl. xiii, fig. 6; **27.** *P. leucas* [Pallas], pp. 199–211; Des Dauphins dont l'existence comme espèce est douteuse (=29 spp.), pp. 212–230, 381—voyez sous, p. 379; Les Narvals—*Monodon*, p. 230; **28.** *M. monoceros* [Linn.], pp. 230–240, 380, pl. xvii, figg. 2, 3; Les Hypéroodons—*Hyperoodons*, pp. 240, 241; **29.** *H. Butzkopf* [Bonnat.], pp. 241–251, pl. ix, figg. 1–3, pl. xvii, fig. 1; Les Platanistes—*Platanista*, pp. 251, 252; **30.** *P. gangeticus* [Lebeck], pp. 252–257, pl. viii, fig. 2, pl. xviii, figg. 1–3; Des Cachalots en général—*Physeter*, pp. 259–286; **31.** *P. macrocephalus* [Linn.], pp. 286–302, 381–386, pl. xix, figg. 1–3; Des Baleines en général—*Balæna*, p. 303; Les Rorquals—*Rorqualus* [gen. n.], pp. 303–321; **32.** *R. Boops* [Albers], pp. 321–334, 386, 387; **33.** *R. musculus* [Linn.], pp. 334–347 (contenent une traduction d'une mémoire de M. Companyo); **34.** *R. antarcticus* [sp. n. = *Balæna lalandi*, Fisch.], pp. 347–354; Les Baleines—*Balæna*, pp. 354–361; **35.** *B. antarctica* [sp. n. = *B. australis*, Desmoul.], pp. 361–364; **36.** *B. mysticetus* [Linn.], pp. 364–375.

Additions et corrections, pp. 375–391. Le Dugong, pp. 375, 376; Le Stellère, pp. 376, 377; Anatomie des Dauphins, pp. 377, 378; Le Delphinorhynque douteux, p. 378; **37.** *Delphinus ceruleo-albus* [Meyen], pp. 378, 379; **38.** Le Dauphin de Bory [*D. Boryi*], p. 379 [voyez p. 217]; Le Marsouin globiceps [*Ph. globiceps*], pp. 379, 380; Du Narval, p. 380; Hyperoodon dans la Méditerranée, p. 381; Dauphins douteux, p. 381; Cachalots, pp. 381–386; Ambre gris, p. 386; Le Rorqual jubarte, pp. 386, 387; Rorquals et Baleines douteuses, pp. 388–391 (relatives à des quelques baleines de Pallas dans sa *Zoog. Rosso-Asiat.*); Baleine dans le Fleuve Saint-Laurent, p. 391; Baleine du Cap, p. 391.

Table chronologique des ouvrages ou se trouvent les notions diverses qui servent au jourd'hui de fondement à l'histoire naturelle des Cétacés, pp. 392–405, titles 1–165+12 interpol., et 1–10=187; Table alphabétique des auteurs, avec les numéros de renvoi à la table chronologique des ouvrages, pp. 407–409.

Table des matières, pp. 411–413; Errata, pp. 415, 416.

Espèces douteuses. **1.** *Delphinus senedetta*, Lacép. ex Rondelet, p. 212; **2.** *D. sinensis*, Desm. ex Osbeck, p. 213; **3.** *D. Pernettyi*, Desm., pp. 213, 214; **4.** *D. canadensis*, Desm. ex Duhamel, pp. 214, 215; **5.** *D. Bertini*, Desm. ex Duhamel, p. 215; **6.** *D. spurius vel anarnacus*, O. Fabr., pp. 215, 216; **7.** *D. ventricosus*, Bonnat. ex Hunter, pp. 216, 217; **8.** *D. Commersonii*, Lacép. ex Commerson, p. 217; **9.** *D. Boryi*, Desm. ex Bory, pp. 217, 218 [voyez p. 379 ou ce dauphin est admetté étre une espèces distincte]; **10.** *D. Sowerbyi*, Desm. ex Blainv., p. 218; **11.** *D. épiodon*, Rafinesque, pp. 218, 219; **12.** *D. feres*, Bonn., pp. 219–221; **13.** *D. niger*, Lacép., p. 221; **14.** *D. longirostris*, Gray, **15.** *D. acutus*, Gray, **16.** *D. intermedius*, Gray, **17.** *D. kingii*, Gray, p. 122; **18.** *D. troncalus* (*sic*), Montaigu, pp. 222, 223; **19.** Le Globiceps de Risso, p. 223; **20.** *D. Bayeri*, Less. ex Risso, pp. 224, 225; **21.** *O*[*xypterus*]. *mongitori*, Rafinesque, p. 225; **22.** *D. cruciger*, Quoy, **23.** *D. bivitatus*, Quoy, pp. 225–227; **24.** *D. albigenus*, Quoy et Gaim., p. 227; **25.** *D. rhinoceros*, Quoy et Gaim., pp. 227, 228; **26.** *D. lunatus*, Less., p. 228; **27.** *D. maculatus*, Less., p. 228, 229; **28.** *D. leucocephalus*, Less., p. 229; **29.** *D. minimus*, Less., pp. 229–230.

Espèces nouveaux: **1.** *Delphinus cephalorhyncus*, p. 158; **2.** *D. hastatus*, p. 161 (tout deux = *D. heavisidi*, Gray, 1828); **3.** *Rorqualus antarcticus*, p. 347 = *Balæna lalandi*, Fisch., 1829; **4.** *Balæna antarctica*, p. 361 = *B. australis*, Desmoul., 1822.

Genre nouveau, *Rorqualus*, p. 303 = *Balænopteridæ*, auct. mod.

Espèces admette, 38; espèces doutouses, 28.

The work, as the title indicates, is a critical digest and compendium of the literature of the *Cetacea* as then existing. Nearly everything of value relating to the various species is noted, and often special papers are given nearly in full. The large number of species considered as of doubtful existence indicates a judicious conservatism on the part of the author rarely exhibited by his predecessors. [887]

1836. Cuvier, G. Recherches | sur les | Ossemens fossiles, | où l'on rétablit les caractères | de plusieurs animaux dont les révolutions du Globe | ont détruit les espèces; | par | Georges Cuvier. | Quatrième Édition, | Approvée et adoptée par le Conseil royal de l'Instruction publique. | Triomphante des eaux, du trépas et du temps, | La terre a cru revoir ses premiers habitans. | Delille. | Tome Huitième, Deuxième Partie. | [Seal.] Paris. | Edmond d'Ocagne, Éditeur, | 12, Rue des Petits-Augustins. | . . . [=names of 4 other publishers.] | 1836. 8°. ll. 3, pp. 1–332. Atlas, 4°, pll. 220–228.

The title of the wrapper has, after "Quatrième Édition," in addition to the above:

Revue, et completée | Au moyen de notes additionelles et d'un supplément | laissés par l'Auteur. |

"Les additions qui se trouvaient à la fin de chacun des volumes des précédentes éditions, sont classées par ordre de matières; et, lorsque le sujet s'y prête, les faits nouveaux recueillis par M. Georges Cuvier sont joints au texte, mais en note seulement, afin de conserver au texte son intégrité. Le plus grand nombre de ces faits cependant est destiné à trouver place dans le *Supplément* dont M. Cuvier avait préparé tous les matériaux, et que M. Laurillard ajoutera aux Rechetches sur les os fossiles."—Extrait de l'Avis de l'éditeur, which also states that the plates were retouched for this edition. The prospectus states, "M. Frédéric Cuvier, de l'Institut, s'est chargé de suivre la réimpression de l'ouvrage de son frère."

Tome Huitième, Deuxième Partie, contains chapters II and III of the Nouvelle édition (1823), *q. v.* The additions consist of (1) note 1 to p. 86 (7 lines), respecting *Delphinus frontatus*, signed "Fréd. Cuv."; (2) note to p. 121 (5 lines), explaining the substitution of the word *rostratus* for *frontatus*, also signed "Fréd. Cuv."; (3) this note is followed by the "Addition à l'histoire des dauphins vivans," appearing at the end of the volume in the earlier editions, with verbal changes in the first paragraph; (4) note (3 lines, signed "F. Cuv.") referring to the note at p. 121; (5) note (1 line, signed "Laur.") supplementing the text; (6) note (14 lines, no signature), entitled "Sur le Rorqual de la mer Adriatique au cabinet de Bologne."

The references in the text to the plates are changed to correspond with their reissue with consecutive numbering.

This Quatrième édition of the *Ossemens fossiles* contains (Tome premier, 1834, pp. i–xxiv) "Observations préliminaires, par M. Frédéric Cuvier," and "Éloge de M. Le Baron Cuvier, par C.-L. Laurillard" (*loc. cit.*, pp. 1–78). The Atlas is accompanied by a detailed explanatory table of the plates, an important desideratum which the other editions lack. [888.]

1836. Cuvier, Georges. Le | Règne animal | distribué | d'après son organisation, | pour servir de base à l'Histoire naturelle des Animaux, | et d'introduction à l'Anatomie comparée, | par | Georges Cuvier. | — | Édition | accompagnée de planches gravées, | représentant | les types de tous les genres, | les caractères distinctifs des divers groupes et les modifications de structure | sur lesquelles repose cette classification; | par | une réunion de disciples de Cuvier, | MM. Audouin, Blanchard, Deshayes, Alcide D'Orbigny, Dozère, Dugès, Duvernoy, Laurillard, | Milne Edwards, Roulin et Valenciennes. | — | Paris | Fortin, Masson et Cie, Libraires, | Successeurs de Crochard, | Place de l'École-de-Médecine, N. 1. | — | Imprimé chez Paul Renouard, | Rue Garancière, n. 5. [1836 *et seq.*] 20 vols. 4°.

Les Mammifères. | — | Avec un Atlas, | par MM. | Milne Edwards, Laurillard, et Roulin. | Texte, l. 1, pp. i–xxxvi, 1–350; Atlas, pll. i–c, coloriées.

Les Cétacés herbivores, pp. 329–331, pl. xcvi. Les Cétacés ordinaires, pp. 331–346, pll. xcvii–c.

Pl. xcvi, fig. 1. *Trichechus manatus*, Linn., fig. orig.; fig. 2. *Halicore Dugong* (animal, d'après MM. Hombron et Jacquinot; squelette et crâne, d'après Cuvier, *Oss. fos.*). Pl. xcvii, fig. 1. *Delphinus Delphis* (fig. orig.); fig. 2. *D. Globiceps* (d'après une planche de Risso, *Hist. nat. de l'Europe mérid.*, t. iii); fig. 3. *D. Phocœna* (fig. orig.). Pll. xcviii–xcix, Appareil soufflant du Marsouin. Pl. c, fig. 1. *Balæna mysticetus*, Linn. (d'après Scoresby, *Arct. Reg.*, t. ii, pl. xii).

The text appears to be unchanged from that of the edition of 1829. [889.]

1836. Dumortier, B. C. Mémoire sur le delphinorhynque microptère échoué à Ostende. Lu à la séance du 5 novembre 1836. <*Nouveaux mém. de l'Acad. roy. des Sci. et Belles-lettres de Bruxelles*, xii, 1839, pp. 13, pll. 3.

Sur les caractères extérieurs et anatomiques du *Delphinorhynchus micropterus*. Pl. i, vu de côte; pl. ii, son squelette; pl. iii, appareil hyoïde, oreille osseuse, système urinaire, le cœur, et la queue. [890.]

1836. **Editorial.** The Black Whale. <*Edinb. Phil. Journ.*, xx, 1836, pp. 208, 209.
On the diminution in numbers of *Balæna mysticetus*. A brief general statement of the matter, with an extract of 16 lines accredited to "Ross's Voyage." [891.]

1836. **Fohmann**, [V.], *et* [F. P.] **Cauchy.** [Rapport sur deux fragmens d'un os fossile trouvés à Tuyvenberg.] <*L'Institut*, 4^e^ ann., no. 150, 23 mars 1836, p. 95.
Fragment de vertèbre d'un Cétacé. [892.]

1836. **Fohmann**, [V.]. Rapport sur un os fossile trouvé à Tuyvenberg.] <*Bull. de l'Acad. roy. des Sci., etc., de Bruxelles*, iii, 1836, pp. 40–42.
Un fragment d'une vertèbre d'un Cétacé du genre *Balæna*. [893.]

1836. **Gerv.** [=**Paul Gervais.**] Lamantin, *Manatus*. <*Dict. pittor. d'Hist. nat. et des Phénom. de la Nature*, iv, 1836, livr. cclxxxii, pp. 331–333.
1. *Manatus americanus*, p. 331, pl. cclxxxviii, fig. 3; **2.** *M. senegalensis*, p. 332; **3.** *M. latirostris*, p. 332. [894.]

1836. **Gerv.** [=**Paul Gervais.**] Mammalogie ou Mastologie. <*Dict. pittor. d'Hist. nat. et des Phénom. de la Natnre*, iv, 1836, livr. cccxvii–cccxx, pp. 614–640.
Cétacés, *passim*. Mammifères de France, pp. 639, 640. Cétacés, **1.** *Delphinorhynchus sa'onicus*, Less.; **2.** *Delphinus micropterus*; **3.** *D. delphis*; **4.** *D. tursio*; **5.** *D. deductor* ou *globiceps*; **6.** *D. edentulus*, Schreb.; **7.** *Physeter macrocephalus*; **8.** *Balæna musculus*; **9.** *B. rostrata*. [895.]

1836. **Herausgeber.** Harlan; kritische Bemerkungen über einige bisher in Nord-Amerika gefundene organische Überbleibsel (nach dem Aushängebogen der *Transactions of the geological Society of Philadelphia*, vol. i, in *James. Edinb. n. phil. Journ.*, 1834, xvii, 342–362; F. f.). <*Neues Jahrb. für Mineral.*, 1836, pp. 99–109.
Manatus und eigentliche Cetaceen, p. 104; *Basilosaurus*, p. 106. [896.]

1836. **Jacob, A.** On the structure of the Mammary Glands in the Cetacea; with Observations on the mechanism of the Mouth and Soft Palate, as applied by the Young Animal in Sucking. <*Fifth Report British Assoc. Adv. Sci.* (Dublin meeting, 1835). Notices of Com., 1836, pp. 86, 87. [897.]

1836. **Lemaoût**, [E.]. Sur la nageoire dorsale du delphinus globiceps (Cuvier). <*Compte rendu de l'Acad. des Sci.*, ii, 1836, p. 65. [898.]

1836. **Mulder, Claas.** Een word over het werk van Geoffroij Saint-Hilaire, den titel voerende: Fragmens sur la structure et les usages des glands mammellaires des Cétacés. Paris, 1834. 8°. avec 2 pl. in 4°. <*Van der Hoeven en de Vriese's Tijdsch. voor Naturl. Gesch. en Phys.*, iii, 1836, ii, pp. 41–—. [899.]

1836. **Rapp, Wilh.** Bemerkungen über die Gehörwerkzeuge der Cetaceen. <*Froriep's Notizen*, xlix, No. 1064, Juli 1836, pp. 116–121.
Auszug. [900.]

1836. **Ravin, F. P.** Oservations anatomiques sur les les Fanons, sur leur mode d'insertion entre eux et avec la membrane palatine. <*Ann. des Sci. nat.*, 2^e^ sér., Zool., v, 1836, pp. 266–278, pl. xi.
Sur les fanons de "*Balænoptera acuto-rostrata*, Lacépède." [901.]

1836. **Rédacteurs.** Histoire naturelle des Cétacés, par M. Frédéric Cuvier. <*Ann. des Sci. nat.*, 2^e^ sér., Zool., v, 1836, p. 379.
Notice. [902.]

1836. **Rédacteurs.** [M. K. E. von Baer. Sur l'anatomie du marsouin.] <*L'Institut*, 4^e^ ann., no. 177, 7 décem. 1836, pp. 401, 410.
Résumé. [903.]

1836. **Robert**, [C.]. [Note sur quelques particularités observées dans le squelette d'un Lamantin du Sénégal.] <*L'Institut*, 4^e^ ann., no. 153, 13 avril 1836, p. 114.
[904.]

1836. **Robert**, [C.]. Lettre de M. Robert sur les spirules, sur le lamentin du Sénégal et sur l'existence, dans cecte même région de l'Afrique, de hyène tachetée. <*Ann. des Sci. nat.*, 2^e^ sér., Zool., v, 1836, pp. 226, 227; *Comp. rend. de l'Acad. des Sci.*, ii, 1836, pp. 362–364.
Donné quelques particularités dans le squelette d'un Lamantin du Sénégal. [905.]

1836. **Salacroux, A.** Noveaux Élémens | d'Histoire Naturelle | contenant | La Zoologie, la Botanique, | la Minéralogie et la Géologie, | par A. Salacroux | Docteur en Médecine de la Faculté de Paris, | Professeur d'Histoire naturelle au Collége de Saint-Louis, | Membre de la Société des Sciences naturelles de France. | Avec 44 planches gravées sur acier et représentant | près de 400 sujets. | — | Paris | Germer Baillière, Libraire-Éditeur, | Rue de l'École de Médecine, No. 13 (*bis*). | . . . [=names of 5 other booksellers.] | 1836. sm. 8°. pp. i–vii, 1–970, pll. i–xliv.

X^e Ordre.—Cétacés, pp. 188–203, pl. xi. I^{re} Famille. Cétacés herbivores, pp. 190, 191. II^e Famille. Cétacés souffleurs, pp. 191–203. Divisée en I^{re} Tribu, Delphinoïdes avec genres *Delphinus*, *Phocaena*, *Monodon*; II^e Tribu, Macrocéphales, avec genres *Physeter*, *Balæna*. Les espèces ne sont pas spécialement indiquées. [905.]

1836. **Vanbeneden.** [=**Beneden, P. J. van.**] Caractères spécifiques des grands cetacés, tirés de la conformation de l'oreille osseuse. <*Compt. rend. de l'Acad. des Sci.*, iii, 1836, pp. 400, 401. [906.]

1837. **Bell, Thomas.** A | History | of | British Quadrupeds, | including the Cetacea. | By | Thomas Bell, F. R. S. F. L. S. V. P. Z. S. | . . . [=titles, 3 lines.] | [Vignette.] | Illustrated by nearly 200 woodcuts. | London: | John Van Voorst, 1, Paternoster Row. | M. DCCC. XXXVII. 8°. pp. i–xviii, 1–526.

Cetacea, pp. 452–526. General Structure, pp. 452–462. Spp. **1.** *Delphinus delphis*, p. 463; **2.** *D. tursio*, p. 469; **3.** *Phocæna communis*, p. 473; **4.** *P. orca*, p. 477; **5.** *P. melas*, p. 483; **6.** *Beluga leucas*, p. 489; **7.** *Hyperoodon butzkopf*, p. 492; **8.** *Diodon sowerbæi*, p. 497; **9.** *Monodon monoceros*, p. 500; **10.** *Physeter macrocephalus*, p. 506; **11.** *P. tursio*, p. 512; **12.** *Balæna mysticetus*, p. 514; **13.** *Balænoptera boops*, p. 520.

Except *Physeter tursio*, all the species are represented in wood-cuts, and include the skulls of seven species, as well as the animal. The text forms a carefully prepared account of the species as then known.

Sirenia,—notice at p. 525 of stranding of specimens of the Manatee ("*Manatus borealis*") on the British coast, from Stewart and Fleming. [907.]

1837. **Bennett, F. De Bell.** On the Natural History of the Spermaceti Whale (*Physeter macrocephalus*). <*Proc. Zool. Soc. Lond.*, 1837, pp. 39–42.

General account of habits. [908.]

1837 (*circa*). **Bonaparte, C. L.** Synopsis | Vertebratorum Systematis | A Charolo L. Bonaparte Muxiniana Principe S. L. S. etc. etc. | Societati Linnaeanae exhibiti | die septima Nov. 1837 [title occupying upper third of page 1]. 8°. pp. 1–30. [Apparently a separate publication.]

In the "Index Familiarum et Subfamiliarum," p. 7, is the following:

Ordo 4. Cete. (*Natantia.*)

9. Manatidae.	18. Manatina.	
10. Delphinidae.	19. Delphinina.	20. Monodontina.
11. Physeteridae.	21. Physeterina.	
12. Balaenidae.	22. Balaenina.	

[909.]

1837. "**Breschet, [G.],** *et* **Roussel de Vauzème.** Nouvelle recherches sur la structure de la peau. Paris, 1837."

Tiré des *Ann. des Sci. nat.*, 2^e sér., Zool., ii, 1834, pp. 167–238, 321–370? *Voyez* 1834. Breschet *et* Roussel de Vauzème.

Cétacés, *passim*. Not seen; title at second hand. [910.]

1837. **Burmeister, H.** Handbuch | der | Naturgeschichte. | Zum Gebrauch bei Vorlesungen | entworfen | von | Hermann Burmeister | . . . [titles, 6 lines.] | — | Berlin, 1837. | Verlag von Theod. Chr. Friedr. Enslin. 8°, in zwei Abtheilungen, l. 1 (general title-page), pp. i–xxvi, 1–858.

Cetacea, pp. 791–793. Divided into 3 families — *Balaenodea*, *Delphinodea*, *Sireniformia*. Genera briefly characterized, with an enumeration of the species.

"*Hyperoodon verus* (Butskopf), atl. Ozean," nom. sp. n., p. 792. [911.]

1837. **G., Z.** Narval, *Monodon*. <*Dict. pittor. d'Hist. nat. et des Phénom. de la Nature*, v, 1837, livr. cccxciv, pp. 591, 592.

Narvalus vulgaris Lacép., *Monodon monoceros*, Lin. [912.]

1837. GERV. [=PAUL GERVAIS.] Mammifères fossiles. <*Dict. pittor. d'Hist. nat. et des Phénom. de la Nature*, v, 1837, livr. cccxxi, pp. 1–5.

Cétacés, *passim*. [913.]

1837. "GRAAH, W. A. Narrative of an Expedition | to the | East Coast of Greenland, | sent by order of the King of Denmark, | in search of | the lost colonies, | under the command of | Captⁿ W. A. Graah, of the Danish Royal Navy, | Knight of Dannebrog, &c. | — | Translated from the Danish, | by | the late G. Gordon Macdougall, F. R. S. N. A., | for the | Royal Geographical Society of London. | With the | original Danish chart completed by the Expedition. | — | London: | John W. Parker, West Strand. | — | M.DCCC.XXXVII. 1 vol. 8vo. pp. xvi, 199, map."

Not seen; title from Coues, *Birds Col. Vall.*, App., 1878, p. 624. The Appendix is said to contain zoölogical matter. [914.]

1837. HERAUSGEBER. G. Fr. Jäger: über die fossilen Säugethiere, welche in Württemberg aufgefunden worden sind. Erste Abtheilung. Stuttgart, 1835, 70 pp. und 9 lithogr. Tafeln in Fol. <*Neues Jahrb. für Mineral., Geogn., Geol. und Petrefakt.*, 1837, pp. 731–740.

Auszug. [915.]

1837. HERAUSGEBER. [Bemerkungen über die Anatomie des Pottfisches (*Physeter macrocephalus*).] <*Froriep's Neue Notizen aus dem Gebiete der Natur- und Heilkunde*, iv, No. 18, Dec. 1837, pp. 273–275.

Abstract von Bemerkungen des Hrn. Debell Bennett's in *Proc. Zool. Soc. Lond.*, 1836, pp. 127–129. [916.]

1837. JARDINE, W. The | Natural History | of the | Ordinary Cetacea | or | Whales. | [By Sir William Jardine, Bart., F. R. S., etc.] Illustrated by thirty-two coloured plates, | numerous wood-cuts, with memoir | and portrait of Lacepede. | Edinburg: | W. H. Lizars, 3, St. James' Square; | S. Highley, 32, Fleet Street, London; and W. Curry, jun. and Co. Dublin. | 1837. [Or,] The | Naturalist's Library | conducted by | Sir William Jardine, Bart. | F. R. S. E., F. L. S., &c. &c. | Mammalia. | Vol. VI. | On the | Ordinary Cetacea | or | Whales. | "Ah! pour les peindre, il faudroit le pinceau de Buffon." | Lacépède. | . . . [=imprint as above.] sm. 8°. pp. i–xvi, 17–264, pll. i–xxix + iv*, frontispiece (portrait of Lacépède), and engraved title-page (figures of Narwal) = 32 pll. Figg. in text.

Title-pages, four in number, pp. i–viii; Advertisement, pp. ix–xii; Contents, pp. xiii–xv; Memoir of M. le Comte de Lacépède, pp. 17–32; Introduction, pp. 33–42; Comparative Anatomy of the Cetacea, pp. 43–75; the Greenland Whale (*Balæna Mysticetus*, Linn.), pp. 76–93, pl. ii; the Northern Whale Fishery, pp. 93–98 (pl. iii, whale's food); Proceedings and dangers in capturing the Whale (pp. 99–121, pll. iv, iv*); Whale of the Southern Seas (*Balæna Australis*, Desmoul.), pp. 122–124; *Rorqualus Borealis*, Cuv., pp. 125–141, pl. v, animal, pl. vi, skeleton; the Lesser Rorqual (*Rorqualus Rostratus*), pp. 142–146, pl. vii; Rorqual of the Southern Seas (*Rorqualus Australis*, Cuv.), pp. 146–150; Fossile Rorquals, etc., pp. 150–153; the Spermaceti Whale (*Physeter Catodon*, Linn.), pp. 154–169, pl. viii (from Robertson), pl. ix (from Beale); [South Sea Fishery], pp. 169–180, pl. x, Dying Struggles of the Spermaceti Whale (from Beale); the Heterodons, p. 181; the Narwhal, or Sea Unicorn (*Narwhalus*), pp. 182–190, pl. xi (from F. Cuvier), and Vignette, p. iii; Diodons, or Two-teethed Whales, pp. 191–193—*Diodon Desmaresti* (p. 191), *Diodon Sowerbi* (p. 192), pl. xii; *Hyperoodon Honfloriensis*, pp. 194–197, pl. xiii; Aodons—*A. Dalei*, Less., pp. 198–200, pl. xiv (from F. Cuvier); *Xiphius—X. Planirostris* (fossil), p. 201; Third Subdivision, pp. 202, 203; the Beluga, or White Whale (*Beluga*), pp. 204–209, pl. xv; *Delphinapterus Peronii*, pp. 210, 211, pl. xvi, from Quoy and Gaim.; the Deductor, or Ca'ing Whale (*Globiocephalus Deductor* or *Melas*), pp. 212–219, pl. xvii, from Scoresby; the *Globiocephalus Rissii*, p. 219, pl. xviii, from F. Cuvier; Fossile Globiceps, pp. 220, 221; the Common Porpoise (*Phocæna Communis*), pp. 222–227, pl. xix, fig. 1, from F. Cuvier; the Porpoise of the Cape of Good Hope (*Phocæna Capensis* Dussm.), p. 227, pl. xix, fig. 2, from F. Cuvier; the Grampus (*Phocæna Grampus*), pp. 228–232, pl. xx; the *P[hocæna]. Griseus*, pp. 233, 234, pl. xxi, from D'Orbigny; the Striped Porpoise (*P[hocæna]. Bivittatus*), pp. 234, 235, pl. xxii, fig. 2; Genus *Delphinus*, pp. 236–238; the Common Dolphin (*Delphinus Delphis*, Linn.), pp. 238–243, pl. xxiii, from Cuvier; Pernetty's Dolphin (*Delphinus Pernettii*, Desm.), pp. 244–246, pl. xxiv; Lead-coloured Dolphin (*Delphinus Plumbeus*, Dussm.), p. 246, pl. xxv, fig. 1; the Bridled Dolphin (*Delphinus Frænatus*, Dussm.), p. 247, pl. xxv, fig. 2; *Delphinus Supercilio-*

1837. Jardine, W.—Continued.

sus, Less., pp. 248, 249, pl. xxvi, from Less. and Garn.; the Fuenas of the Chilians, p. 250, pl. xxii, fig. 2; *Delphinus Youngii* (Fossile), p. 251; Delphinorhynchus of Breda (*Delphinorhynchus Bredanensis*, Less.), p. 252, pl. xxvii, from Cuvier; the Soosoo of the Ganges (*Soosoo Gangeticus*, Less.), pp. 254–256, pl. xxviii; the Soosoo of M. De Borda (*Soosoo Bordaii*, Fossile, Cuv.), p. 257; *I[nia]. Boliviensis*, D'Orbigny, Fr. Cuvier, pp. 259–261, pl. xxix; the Rhinoceros Whale (*Oxypterus Rhinoceros*, Less.), pp. 262–263, cut, from Quoy and Gaimard.

A popular general account of the *Cetacea*.

About 32 species are described and figured, arranged in 17 genera. The figures are copied from those of previous authors, sometimes more or less altered in position, and embellished with "appropriate scenery." In many cases the original sources are indicated. The technical names above given in parentheses are those adopted in the table of contents; these generally correspond with the first name given in the body of the work in the lists of synonyms of the species, and the authority above added to the name is thence derived. [917.]

1837. McCulloch, J. R. A | Dictionary, | practical, theoretical, and historical, | of | Commerce | and | Commercial Navigation: | Illustrated with Maps and Plans. | By J[ohn]. R[amsey]. McCulloch, Esq. | A New Edition. | Corrected and improved: | With an enlarged Supplement, | containing many new Articles, and bringing down the information | contained in the work to | December, 1836. | — | . . . [=4 lines, quotation.] | — | London: | Printed for | Longman, Rees, Orme, Brown, Green, and Longman. | MDCCCXXXVII. Large 8°. pp. i–xvi, 1–1269,+1–118.

Whalebone, p. 1238. Whale (Common) [*Balaena mysticetus*], p. 1238. Whale-Fishery, pp. 1238–1245. Whale Fishery (Southern), Suppl., p. 116. Whale Fishery (Northern), Suppl., p. 117. [918.]

1837. Pusch, Georg Gottlieb. Polens Paläontologie | oder | Abbildung und Beschreibung | der | vorzüglichsten und der noch unbeschriebenen Petrefakten aus den | Gebirgsformationen in Polen, Volhynien und den Karpathen | nebst | einigen allgemeinen Beiträgen zur Petrefaktenkunde und einem Versuch zur | Vervollständigung der Geschichte des europäischen Auer-Ochsen. | Von | Georg Gottlieb Pusch, | Münzmeister zu Warschau, ehemaligen königl. polnischen Bergrath und Professor, Mitglied einiger gelehrten Gesellschaften | zu Moskau, St. Petersburg, Paris, Dresden, Breslau, Bonn und Altenburg. | — | Mit Abbildungen auf 16 lithographirten Tafeln. | — | — | Stuttgart. | E. Schweizerbart's Verlagshandlung. | 1837. 4°. pp. i–xiii, 1–218.

Fossile Ueberreste von Wirbelthieren, pp. 167, 168. Rückenwirbel eines Meer-Säugthiers (pp. 167, 168, pl. xv, fig. 4) aus Jurakalk. Wahrscheinlich ein Cetaceen-Wirbel. [919.]

1837. Rapp, W. Die Cetaceen | zoologisch-anatomisch dargestelt | von | Wilhelm Rapp, Professor der Anatomie in Tübingen. | — | Mit Abbildungen. | — | Stuttgart und Tübingen, | Verlag der J. G. Cotta'schen Buchhandlung. | 1837. 8°. l. 1, pp. i–vi, 1–182, l. 1, pll. i–viii.

Geschichtliches, pp. 3–20. I. Zoologischer Theil, pp. 21–58.

A. Pflanzenfressende Cetaceen (Sirenia, Ill.). **1.** *Manatus americanus* Desmar., p. 25 (*M. senegalensis* et *latirostris*, spp. dub.); **2.** *Halicore indica* Desmar., p. 26; **3.** *Stellurus borealis* Desmar., p. 27.

B. Aechte Cetaceen. **1.** *Delphinus delphis* Linn., p. 29; **2.** *D. longirostris* Dussumier, p. 30; **3.** *D. velox* Dussumier, p. 30; **4.** *D. Tursio* Bonnat., p. 31; **5.** *D. capensis* Gray, p. 31; **6.** *D. plumbeus* Dussumier, p. 32; **7.** *D. superciliosus* Lesson et Garnot, p. 32; **8.** *D. frenatus* Dussumier, p. 32; **9.** *D. coeruleo-albus* Meyen, p. 33; **10.** *D. rostratus* Cuv., p. 33; **11.** *D. dubius* Gray, p. 33; **12.** *D. Boryi* Desmar., p. 34; **13.** *D. lunatus* Lesson et Garnot, p. 34; **14.** *D. Novae Zeelandiae* Quoy et Gaimard, p. 34; **15.** *D. (Phocaena) globiceps* Cuv., p. 34; **16.** *D. (Ph.) Rissoanus* Cuv., p. 36; **17.** *D. (Ph.) griseus* G. Cuv., p. 36; **18.** *D. (Ph.) Phocaena* Linn., p. 36; **19.** *D. (Ph.) hastatus* Fr. Cuvier, p. 37; **20.** *D. (Ph.) cruciger* Quoy et Gaimard, p. 38; **21.** *D. (Ph.) bivittatus* Lesson et Garnot, p. 39; **22.** *D. (Ph.) compressicauda* Lesson, p. 39; **23.** *D. (Ph.) obscurus* Gray, p. 39; **24.** *D. (Ph.) gladiator* (=*D. orca* Fabr. non Linn.), p. 39; **25.** *D. (Delphinorhynchus) Geoffroyi* Desmar., p. 40; **26.** *D. (D.) coronatus* Fréminville, p. 40; **27.** *D. (D.) micropterus* Cuv., p. 40; **28.** *D. (Platanista) gangeticus* Lebeck, p. 41; **29.** *D. (Inia) Boliviensis* d'Orbigny, p. 42; **30.** *D. (Delphinapterus) leucas* Pallas, p. 42; **31.** *D. (D.) leucorhamphus* Péron, p. 43; **32.** *D. (D.) phocaenoides* Dussumier, p. 43; **33.** *D. (Heterodon) Dalei* Lesson, p. 44; **34.** *D. (H.) Desmaresti* Risso, p. 45; **35.** *Monodon*

1837. RAPP, W.—Continued.

monoceros Linn., p. 46; **36.** *Physeter macrocephalus* Shaw, p. 49; **37.** *Balaenoptera borealis* Lesson, p. 52; **38.** *B. longimana*, p. 55; **39.** *Balaena mysticetus* Linn., p. 55; **40.** *Balaena antarctica* Less., p. 58, = spp. 40.

II. Anatomischer Theil, pp. 59–179. Von den Knochen, pp. 61–78. Von den Muskeln, pp. 79–91. Auge, pp. 92–97. Gehörorgan, pp. 98–104. Nasenhöhle, pp. 105–109. Allgemeine Bedeckungen, pp. 110–114. Nervensystem, pp. 115–123. Verdauungswerkzeuge, pp. 124–145. Athmungswerkzeuge, pp. 146–152. Harnwerkzeuge, pp. 153–155. Gefässsystem, pp. 156–168. Werkzeuge der Fortpflanzung, pp. 169–176.

Erklärung der Abbildungen, pp. 181, 182. Erste Tafel, Eines 13 Par. Zoll langen Fötus des Dugong (*Halicore Indica*). Zweite Tafel, *Delphinus Capensis*, Gray. Dritte Tafel, *Delphinus hastatus* F. Cuv. Fig. A, von der Seite; fig. B, von unten. Vierte Tafel, Skelet eines erwachsenen, männlichen *Delphinus delphis* aus dem mittelländischen Meere. Fünfte Tafel, Skelet eines *Delphinus Phocaena* aus der Nordsee. Sechste Tafel, Der Magen der Delphine in den verschiedenen Lebensperioden; drei Figuren. Siebente Tafel, Niere von *Delphinus delphis* und eines fast reifen Fötus des Dugong. Achte Tafel, Herz des Dugong-Fötus. Alle Figuren sind nach der Natur.

The historical introduction traces briefly the history of the subject from the time of Aristotle to date, with copious references to the literature in foot-notes.

Theil I gives a carefully prepared synopsis of the species, with brief diagnoses, the principal synonymy, and references to the more important works relating to the species. Theil II is devoted to a general account of the anatomy of the Sirenians and Cetaceans, largely from original investigation. The eight plates are based on material studied by the author. [920.]

1837. RATHKE, [M. H.]. Bemerkungen über ein angeblich bei Tannenberg gefundenes Schulterblatt eines Wallfisches. <*Preuss. Provinz.-Blätter*, xviii, 1837, 562–565. [921.]

1837. RAVIN, [F. P.]. Anatomische Beobachtungen über die Barten, über deren Einfügungsweise in Bezug auf einander und auf die Gaumenhaut. <*Froriep's Neue Notizen*, i, No. 3, Jan. 1837, pp. 33–40, figg. 16–25.

Aus *Ann. des Sci. Nat.*, 2e sér., v, 1836, pp. 266–278, 1 pl. [922.]

1837. RÉDACTEUR. [Notes sur l'anatomie de la Baleine au sperma-ceti (*Physeter macrocephalus*, auct.), principalement sur sa dentition et sa structure ainsi que l'aspect que présentent ses parties molles, par M. Debell Bennett.] <*L'Institut*, 5e ann., no. 221, novembre 1837, p. 359.

Résumé. [923.]

1837. RICHARDSON, J. Report on North American Zoology. <*Rep. 6th Meeting Brit. Ass. Adv. Sci.* for 1836, v, 1837, pp. 121–224.

Ord. *Cetacea*, pp. 161, 162. Nominal list of 19 species of *Sirenia* and *Cetacea*. [924.]

1837. "SUCKOW, G. A. Osteologische Beschreibung des Walles [*Balaena mysticetus*]. Mannheim, C. Lamina, 1837. 4°. 5 pll."

Not seen; title at second hand. [925.]

1837. VANBENEDEN, [P. J.]. [=BENEDEN, P. J. VAN]. On the Specific Characters of the larger Cetacea, as deduced from the Conformation of the Bones of the Ear. <*Edinb. New Philos. Journ.*, xxii, 1837, p. 198.

From *Compte Rendu*, iii, 1833, pp. 400, 401. [926.]

1837. VROLIK, W. Ontleedkundige aanmerkingen over den Noordschen Vinvisch (Balaenoptera rostrata), in de maand September desjaars 1835 te Wijk aan Zee gestrand. <*Vander Hoeven en de Vriese's Tijdsch. voor Natuurk. Gesch. en Phys.*, iv, 1837–38, pp. 1–24.

On various points in its anatomy. [927.]

1838. ANON. Notices of some of the specimens of natural history, which were collected during the voyage of the Morrison to Lewchew and Japan. <*Chinese Repository*, vi, 1838, pp. 406–417.

Globiocephalus Rissii, pp. 411–413. Description of external characters with a page of anatomical observations. [928.]

1838. BAER, K. E. VON. Untersuchungen über die ehemalige Verbreitung und die gänzliche Vertilgung der von Steller beobachteten nordischen Seekuh (*Rytina*, Ill.). <*Bull. de l'Acad. imp. des Sci. de St.-Pétersbourg*, iii, 1838, pp. 355–359.

Extrait en langue français du mémoire de cet titre, imprimé dans les *Mém.* de la même acad. [929.]

1838. BENNETT, F. DEBELL. Ueber *Physeter macrocephalus*, besonders sein Gebiss. <*Isis von Oken*, 1838, pp. 217, 218.

Auszug aus *Proc. Zool. Soc. Lond.*, iv, 1836, pp. 127–129. [930.]

1838. BLAINVILLE, M. H. DE. Sur les Cachalots. <*Ann. franç. et étrang. d'Anat. et de Phys.*, ii, 1838, pp. 335–337, pl. x.

Physeter breviceps, sp. n. (p. 337), pl. x, crâne. [931.]

1838. BRESCHET, G. Aperçu descriptif de l'organe auditif du Marsouin (*Delphinus phocœna* L.). <*Ann. des Sci. nat.*, 2e sér., Zool., x, 1838, pp. 221–229, pl. v.

1° Conduit auditif externe. 2° Os tympanal. 3° Cavité du tympan. 4° Oreille interne ou labyrinthe. [932.]

1838. BRONN, HEINRICH GEORG. Lethaea Geognostica, | oder | Abbildungen und Beschreibungen | der | für die Gebirgs-Formationen bezeichnendsten | Versteinerungen, | mit | lithographirten 47 Quart., 1 Folio-Tafel und 2 Tabellen, | von | Heinrich Georg Bronn, | . . . [= titles, 7 lines.]' | — | Zweite Auflage. | Zweiter Band, | das Kreide- und Molassen-Gebirge enthaltend. | — | Stuttgart. | E. Schweizerbart's Verlagshandlung. | 1838. 8°. ll. 2, pp. 545–1346, ll. 2.

Cetacea, pp. 1175–1177, pll. xliii, fig. 6. *Ziphius planirostris*, p. 1176, pl. xliii, fig. 6. [933.]

1838. GLUGE, [THÉOPHILE]. Sur la terminaison des nerfs.—1° Sur leur terminaison dans la peau de la baleine. <*Bull. de l'Acad. roy. des Sci. et Belles-lett. de Bruxelles*, v, 1838, pp. 20–25. [934.]

1838. HUMBOLDT, ALEXANDER VON, *und* A. F. A. WIEGMANN. Ueber den Manati des Orinoko. <*Wiegmann's Arch. für Naturgesch.*, 1838, Bd. i, 4. Jahrg., pp. 1–10, pll. i, ii.

Aus dessen französischen Manuscripten übersetzt mit Bemerkungen vom Dr. A. F. A. Wiegmann. *Sehe* HUMBOLDT, A. v., *Voyag. aux rég. équinox.*, vi, p. 235, pll.

Detailed account of its external characters, with measurements, of the mouth parts, and some account of its digestive tract, food, and habits. Pl. i gives views of the animal in profile and from below; pl. ii, of the mouth, of the head from above and in profile, and an ideal longitudinal section of the body. [935.]

1838. KAUP, J. J. [Ueber Zähnen von *Halytherium* und *Pugmeodon* aus Flonheim.] <*Neues Jahrb. für Mineral.*, 1838, p. 319, pl. ii, D. figg. 1, 2, C. figg. 1, 2.

Halytherium dubium; Pugmeodon Schinzii. [936.]

1838. KAUP, J. J. [Ueber Zähnen von *Halitherium*.] <*Neues Jahrb. für Mineral.*, 1838, p. 536. [937.]

1838. "KNOX, F. J. Catalogue of Anatomical Preparations illustrative of the Whale, by F. J. Knox, Conservator of the Museum in Old Surgeons' Hall. 8°. Edinburgh, 1838."

Not seen; title and commentary here following from Gray (*Cat. Mam. Brit. Mus.*, pt. i, Cetacea, 1850).

"In 1828 Mr. F. J. Knox, the Conservator of the Museum of the Old Surgeons' Hall in Edinburgh, published a catalogue of the Anatomical preparations of the Whale, in which he gives many interesting details on the anatomy of the *Balæna maximus* and *B. minimus*, which had been stranded near Edinburgh, of the fœtus of *B. mysticetus* from Greenland, and of *Delphinus Tursio* (*D. leucopleurus*). *D. Delphis* and *Phocæna communis*, *Soosoo gangeticus*, and *Halicore Indicus;* but the paper has been very generally neglected or overlooked," (*loc. cit.*, p. 3).

"Mr. Knox (*Cat. Prep. Whale*) gives the best account of the development, position and distinction between the baleen of the Whales of the North Sea which has come under my observation" . . . (*loc. cit.*, *p.* 7).

"But the pamphlet in which these observations were published, being a mere guide to the

1838. "KNOX, F. J."—Continued.

exhibition, has been overlooked, and I could only procure a copy last year after great trouble, and from the family of the author" (*loc. cit.*, p. 21).

Dr. Gray makes frequent quotations from this paper, which seems to be one of considerable importance. [938.]

1838. MEYER, HERM. v. [Halianassa.] <*Neues Jahrb. für Mineral.*, 1838, p. 667.

Halianassa, gen. n., zwischen *Halicore* und *Manatus*. [939.]

1838. OKEN, [L.]. Allgemeine | Naturgeschichte | für | alle Stände, | von | Professor Oken. | — | Siebenten Bandes zweyte Abtheilung, | oder | Thierreich, vierten Bandes zweyte Abtheilung. | Säugthiere 1. | — | Stuttgart, | Hoffmann'sche Verlags-Buchhandlung. | 1838. 8°. pp. i–viii, 689–1432.

Zweyte Stuffe. Obere Haarthiere. Vierte Ordnung. Hufthiere. [=Die Walfische, Schweine und Rinder.] 10. Zunft. Die Wale oder Walfische, pp. 993–1115.

Historische Bemerkungen, pp. 995–1012.

A. Die fleischfressenden Wale (=*Cetacea*), pp. 1012–1091. a. Die Grossköpfe. I. Genus. Die Bartenwale. **1.** *Balæna mysticetus*, pp. 1014–1036; **1** *b.* Nordcaper (*B. glacialis*, *musculus*), pp. 1036–1039; **1** *c. B. australis*, p. 1039; **2.** *B. physalus*, *boops*, *musculus*, *rostrata*, pp. 1039–1047.

II. Genus. Die Pottfische . . . *Physeter*, pp. 1047, 1048. **1.** *Ph. macrocephalus*, pp. 1049–1058. **1** *b. Ph. polycyphus*, p. 1058.

C. Die Dünnköpfe, p. 1059. III. Genus . . . *Monodon*, p. 1059. **1.** *M. monoceros*, pp. 1059–1067. IV. Genus . . . *Delphinus*, pp. 1067–1070. a. Die Spitzköpfe. **1.** *D. Delphis*, p. 1070; **2.** *D. tursio*, *orca* L., pp. 1070–1072; **3.** *D. gangeticus*, p. 1072. b. Stumpfköpfe; **4.** *D. phocæna*, pp. 1072–1074; **5.** *D. aries*, *gladiator*, *orca*, Fabr., pp. 1074–1078; **6.** *D. melas*, *globiceps*, pp. 1078–1085; [**7.**] *D. leucas*, *albicans* (*Beluga*), pp. 1085–1088; [**8.**] *D. rostratus* sive *edentulus* (*Hyperoodon*), pp. 1088–1091.

B. Die pflanzenfressenden Wale (=*Sirenia*), pp. 1091–1115. V. Genus . . . *Manatus*. **1.** *M. borealis* (*Rytina*), pp. 1091–1098; **2.** *Manatus atlanticus*, *Trichechus manatus*, pp. 1098–1106; **3.** Die ostindische oder der Dujong (*Halicore*), pp. 1106–1115; **4.** *Dinotherium giganteum*, p. 1115.

Genn. Cetac., 4; spp. 11.

The references to writers of the 15th to the 18th centuries are especially full, as well as to the still earlier classic authors. Only the more important species are treated at length. Several species are in some cases obviously confounded under the same specific designation. [940.]

1838. OWEN, [R.]. [On the Anatomy of the Dugong.] <*Proc. Zool. Soc. Lond.* 1838, pp. 28–45.

Digestive Organs, pp. 29–34; Circulating System, pp. 34–36; Respiratory System, pp. 36–39; Uropoietic System, p. 39; Generative System, pp. 30, 40; Osseus System, pp. 40, 41; Dentition, pp. 41–43; Measurements of cranium, p. 44: external measurements and measurements of intestines, p. 45. [941.]

1838. SERRES, MARCEL DE. Note sur les animaux des terrains marins supérieurs découverts dans le sol immergé des environs de Montpellier. <*Ann. des Sci. nat.*, 2ᵉ sér., Zool., ix, 1838, pp. 281–292.

Mammifères marins, pp. 285, 286. 1° Lamantins (*Manatus* Cuv.), 2° Dauphin à longue symphyse, Cuvier, 2° *bis*. Dauphin très voisin du Dauphin ordinaire (*Delphinus Delphis*), p. 285; 3° Dugong (*Halicore medius*), 4° Baleine (*Balæna*), 5° Cachalots (*Physeter*), 6° Rorqual, p. 286. [942.]

1838. THOMPSON, WILLIAM. Upon the Identity of Hunter's Delphinus bidentatus, Baussard's Hyperoodon Honfloriensis, and Dale's Bottle Head Whale. <*Charlesworth's Mag. Nat. Hist.*, ii, 1838, pp. 221–223.

All referred to *Hyperoodon honfloriensis* (=*H. bidens*); brief account of the external characters and osteology of a specimen stranded at Hull, England. [943.]

1838. TRAILL, [T. S.]. Ueber einige Dinge bey den Cetaceen. <*Isis von Oken*, 1838, pp. 46, 47.

Auszug aus Uebersetzung aus *Edinburgh New Phil. Journ.*, vol. xvii, 183, p. 177. [944.]

1838. TRAILL, [T. S.]. Ueber den Bau und die Verrichtung der Milchdrüsen der Wale. <*Isis von Oken*, 1838, pp. 47, 48.

Auszug aus dem *Edinburgh New Phil. Journ.*, xvii, p. 263. [945.]

1838. VROLIK, W. Note sur l'anatomie d'une *Baleinoptère à bec* (Balænoptera rostrata) échouée au mois de septembre de l'année 1835 sur les côtes de la Hollande, près du village de Wijk aan Zee. <*Ann. des Sci. nat.*, 2e sér., Zool., ix, 1838, pp. 65–77.

Description des viscères de l'animal du sexe féminin. [946.]

1838. VROLIK, [W.]. Ueber die Anatomie einer *Balaenoptera rostrata*, die im Septbr. 1835 an der Holländischen Küste strandete. <*Froriep's Neue Notizen*, vii, No. 152, Sept. 1838, pp. 304-313, 325–327. [947.]

1838. WATERHOUSE, G. R. Catalogue | of | the Mammalia | preserved in | the Museum | of | the Zoological Society | of London. | G. R. Waterhouse, | curator. | — | Second edition. | — | London: | Printed by Richard and John E. Taylor, | Red Lion Court, Fleet Street, | 1838. 8°. pp. 1–68.

Order IV, *Cetacea*, 4 spp., including *Halicore Dugong*. [948.]

1838. WATERHOUSE, [G. R.]. On a new Species of the genus Delphinus. <*Proc. Zool. Soc. Lond.*, 1838, pp. 23, 24.

Delphinus fitzroyi; external characters; measurements by Charles Darwin. "*Habitat*, Coast of Patagonia, lat. 42° 30′ (April)". [949.]

1838. WIEGMANN, A. F. A. [Ueber den amerikanischen Manati.] <*Wiegmann's Arch. für Naturgesch.*, 1838, Bd. i, 4. Jahrg., pp. 10–18.

Supplement to a paper entitled "Ueber den Manati des Orinoko," by A. von Humboldt (*see* 1838. HUMBOLDT, A. VON), translated from French MSS. of A. von Humboldt. The translation is annotated by the translator. The supplement is devoted to a discussion of the number of species of Manati inhabiting the coasts and islands of America, maintaining "dass der Manati Südamerika's von denen der westindischen Gewässer specifisch verschieden ist." A paragraph is also devoted to the etymology of the word *Manati*. [950.]

1838. "ZIMMERMANN, W. T. A. W. De zee, hare bewoners en wonderen. Uit het Hoogd. Amst., 1838. 2 dln. 8°.

"Zie aldaar: De walvische en de walvischvangst. 3e stuk. bl. 120–164."
Not seen; title and reference from Bosgoed, *op. cit.*, p. 253, no. 3614. [951.]

1838–39. KRØYER, HENRIK. Nogle Bemærkninger med Hensyn til Balænoptera rostrata. <*Krøyer's Tidsskrift*, ii, 1838–39, pp. 617–638, fig. in text, p. 627.

Synonymy, external characters (with detailed measurements), and osteology. [952.]

1839. A., M. S. Recherches sur la structure et la formation des dents des Squaloïdes. <*Rev. zool.*, 1839, pp. 369–370.

Analyse d'un mémoire de cet titre par M. Owen, presenté à l'Acad. roy. des Sci. de Paris, séance du 16 décembre 1839. [953.]

1839. ANON. The Natural History of the Sperm Whale, &c. &c. To which is added, a Sketch of a South-Sea Whaling Voyage. By Thomas Beale, Surgeon. <*Quart. Rev.*, lxiii, 1839, pp. 318–341, cuts.

Review of the work, with copious extracts. [954.]

1839. ANON. Histoire | naturelle | des Animaux | les plus remarquables de la classe des Mammifères | (Quadrupèdes et Cétacés); par | un Naturaliste du Muséum; | Ornée de soixante figures d'Animaux, | Dessinées et gravées par C. Franc, peintre d'histoire naturelle. | [Vignette.] Paris, | à la Libraire de Piété, d'Éducation, Sciences, | Arts; et Magasin d'Objets Pieux | de J. Samson, rue de Sèvres, 17. | 1839. 12°. ll. 2, pp. i–viii, 1–232, pl. i–xii.

Mammifères édentés. § ii. Cétacés, pp. 126–139, pl. vi, fig. 6, Dauphin, pl. vii, Cachalot. [955.]

1839. BONAPARTE, C. L. Prodromus systematis Mastozoologiæ Caroli luciani Bonaparte Muxiniani Principis. 8°. pp. 1–13.

The copy examined, although apparently complete, has neither title-page, imprint, nor date.

Ordo 4. *Cete*, pp. 4, 5, = Familia 9, *Manatidæ*. Subfamilia 18, *Manatina*. Familia 10, *Delphinidæ*. Subfamilia 19, *Delphinina*. Subfamilia 20, *Monodontina*. Familia 11, *Physeteridæ*. Subfamilia 21, *Physeterina*. Familia 12, *Balænidæ*. Subfamilia 22, *Balænina*. Cum characteribus. [956.]

1839. Bruno, Giovanni Domenico. Illustrazione di un nuovo Cetaceo fossile. <*Mem. della Reale Accad. delle Scienze di Torino*, ser. 2, i, 1839, pp. 143–160, pll. i, ii.

Part of skull, numerous vertebræ, ribs, etc., of a Sirenian. *Chierotherium*, gen. n., p. 160. [957.]

1839. Desm., E. [=? Desmarest, E.]. Stellère, *Stellurus*. <*Dict. pittor. d'Hist. nat. et des Phénom. de la Nature*, ix, 1839, livr. dclxii, p. 173.

Stellurus [=*Rhytina*] *borealis*. [958.]

1839. Dumortier, B. C. Mémoire sur le Delphinorhynque microptère échoué à Ostende. <*Nouv. Mém. de l'Acad. roy. des Sci. et Belles-lett. de Bruxelles*, xii, 1839. 17 pp. 3 pll.

Caractères externes et ostéologiques, et sur les organes internes. Pl. i, Delphinorhynque microptère, vu de côte. Pl. ii, Son squelette. Pl. iii, Appareil hyoïde, oreille osseuse, système urinaire, le cœur, la queue, vue en dessus. [959.]

1839. Editors. The Natural History of the Sperm Whale. By Thomas Beale. . . . London, Van Voorst, 1839. <*Charlesworth's Mag. Nat. Hist.*, iii, 1839, pp. 249–252.

Review of the work. [960.]

1839. Harlan, [R.]. Notice sur le *Basilosaure* et sur le *Batrachiosaure*. <*Ann. des Sci. nat.*, 2e sér., Zool., xii, 1839, p. 221.

Basilosaurus, "un noveau genre de Sauriens." *Voyez* 1839. Owen, R. Sur le genre *Basilosaurus*, Harlan. [961.]

1839. Harlan, Richard. [Sur le Basilosaurus.] <*Bull. Soc. géol. de France*, x, 1839, p. 89.

In an abstract of a letter to M. Verneuil. Doubts *Basilosaurus* being a true Saurian. [962.]

1839. Harlan, [Richard]. [Sur les affinités du *Basilosaurus*, etc.] <*Bull. Soc. géol. de France*, x, 1839, p. 91. [963.]

1839. Herausgeber. R. Harlan: über die Entdeckung des Basilosaurus und des Batrachiosaurus (*Lond. Edinb. Phil. Mag.*, 1839, xix, 302). <*Neues Jahrb. für Mineral., Geogn., Geol. und Petrefakt.*, 1839, pp. 622, 623.

Auszug. [964.]

1839. Herausgeber. R. Owen: Beobachtungen über die Zähne des Zeuglodon, Harlan's Basilosaurus ([*Lond. Edinb. Phil. Mag.*, 1839], S. 302–307). <*Neues Jahrb. für Mineral., Geogn., Geol. und Petrefakt.*, 1839, pp. 623–626.

Auszug. [965.]

1839. Leiblein, V. Grundzüge | einer | methodischen Uebersicht | des | Thierreiches | nach seinen Classen, Ordnungen, Familie'n und | Gattungen, nebst Aufzählung ihrer Haupt- | Repräsentanten. | — | Ein Leitfaden beim zoologischen Studium. | Von | V. Leiblein, | . . . [= titles, 5 lines.] | — | Erstes Bändchen. | Der Mensch und die Säugethiere. | — | Würzburg. | In Commission der Stahel'schen Buchhandlung. | — | 1839. <Berichte | vom | zoologischen Museum | der königlichen | Julius-Maximilians Universität | zu Würzburg, | enthaltend | eine methodische Uebersicht der Thiere | dieser Sammlung. | Vom | Conservator dieses Attribut's | Prof. Dr. V. Leiblein. | — | Erster Bericht. | Eine kurze Geschichte des zoologischen Museum's, nebst | Aufriss der Anordnung im Allgemeinen, und die | Aufzählung der Säugethiere umfassend. | — | Würzburg. | Druck der Carl Wilhelm Becker'schen Universitäts-Buchdruckerei. | — | 1839. 8°. ll. 4, pp. 1–182.

II. Wassersäugethiere. IX. Ordnung. *Cetacea*. Fischzitzthiere.

A. Pflanzenfressende, *Herbivora*. 1. Fam. *Halicorea*, Sirener. 2. Fam. *Rytinea*, Borkenwalle.

B. Fleischfressende, *Carnivora*. 3. Fam. *De[l]phinoidea*. Delphine. 4. Fam. *Balaenodea*, Bartenwalle.

Sirenia:—1. *Manatus americanus*, 2. *M. Senegalensis*, 3. *Halicore Dugong*, p. 165; 4. *Rytina Stelleri*, p. 167. (Between *Halicore* and *Rhytina* is interpolated the extinct genus *Dinotherium*.)

Cetacea:—1. *Delphinus Delphis*, 2. *D. Phocaena*, 3. *D. cruciger*, 4. *D. albigena*, 5. *D. gangeticus*, p. 168; 6. *Oxypterus Mongitori*, 7. *O. Rhinoceros*, 8. *Delphinapterus leucorham-*

1839. LEIBLEIN, V.—Continued.

phus, **9.** *Epiodon Urganantus* (Raf.), **10.** *Ancylodon groenlandicus* (= *Monodon spurius*, Fabr.), **11.** *Monodon Monoceros*, p. 169; **12.** *Physeter macrocephalus*. **13.** *P. polycyphus*, **14.** *P. Trumpo*, **15.** *P. cylindricus*, **16.** *Mular* (Klein) *Tursio*. **17.** *M. microps*, p. 170; **18.** *Balaena Mysticetus*, **19.** *Balaenoptera Physalus*, **20.** *B. longimana*, **21.** *B. rostrata*, p. 171. [966.]

1839. MEYER, HERM. V. [*Pugmeodon Schinzii* Kaup gehört zu *Halianassa Studeri* Meyer.] <*Neues Jahrb. für Mineral.*, 1839, p. 77. [967.]

1839. MEYER, HERMANN V. Die fossilen Saügethiere, Reptilien und Vögel aus den Molasse-Gebilden der *Schweitz*. <*Neues Jahrb. für Mineral.*, 1839, pp. 1–9.

Cetaceen, p. 4: *Halianassa Studeri*, H. v. Meyer, und ein ungestimmt Genus. [968.]

1839. MITCHELL, T. L. Three Expeditions | into the interior of | Eastern Australia; | with descriptions of the recently explored region of | Australia Felix, and of the present Colony of New South Wales: | Major T[homas]. L[ivingston]. Mitchell, F. G. S. & M. R. G. S. | Surveyor-General. | [Vignette.] Second Edition, carefully revised. | — | In two volumes. | Vol. I [-II]. | London: | T. & W. Boone, New Bond Street. | MDCCC XXX IX. 2 vols. 8°. pll. and maps.

Whale Fishery, ii, p. 241; A Whale-chase, pp. 242, 243. [969.]

1839. OWEN, R. Recherches sur la structure et la formation des dents des Squaloïdes, et application des faits observés à une nouvelle théorie du développement des dents. <*Ann. des Sci. nat.*, 2^e^ sér., Zool., xii, 1839, pp. 209–220, pl. ix. [970.]

1839. OWEN, R. Observations sur les dents du *Zeuglodon* (Basilosaurus du D^r^. Harlan). <*Ann. des Sci. nat.*, 2^e^ sér., Zool., xii, 1839, pp. 222–229.

Zeuglodon, gen. n. = *Basilosaurus*, Harlan. [971.]

1839. OWEN, [R.]. Ueber die Zähne des *Zeuglodon*, Harlans *Basilosaurus*. <*Isis von Oken*, 1839, pp. 602–604.

Uebersetzung aus dem *London and Edinburgh Phil. Mag. and Journ. Sci.*, xiv, April, 1839, p. 302. [972.]

1839. OWEN, RICHARD. Ueber die Zähne des *Zeuglodon*, Basilosaurus des Dr. Harlan. <*Froriep's Neue Notizen*, x, no. 210, Mai 1839, pp. 177–182.

Aus *London and Edinb. Phil. Mag.*, xiv, April, 1839, p. 302. [973.]

1839. OWEN, RICHARD. Observations on the teeth of the *Zeuglodon*, *Basilosaurus* of Dr. Harlan. <*Charlesworth's Mag. Nat. Hist.*, iii, 1839, pp. 209–213.

From *Proc. Geol. Soc. Lond.*, iii, 1838–42 (1839), pp. 24–28.

Shows the genus *Basilosaurus* to be Mammalian and not Saurian, and "proposes to substitute for the name of *Basilosaurus* that of *Zeuglodon*" (p. 213). [974.]

1839. RICHARDSON, WILLIAM. On the Fossil Remains of Cetacea. <*Charlesworth's Mag. Nat. Hist.*, iii, 1839, pp. 98, 99.

Account of Cetacean vertebræ from the brick earth of Herne Bay, Kent, England. [975.]

1839. THOMPSON, B. F. History of Long Island; | containing | An Account | of the | Discovery and Settlement; | with other | important and interesting matters | to the | Present Time. | By Benjamin F. Thompson, | Counsellor at Law. | . . . [=quotation, 5 lines.] | New York: | Published by E. French, 146 Nassau Street. 1839. 8°. pp. i–x, 11–536, 2 pll.

Whaling business of Southampton (Sag Harbor), pp. 221–224. A brief, partly statistical, account. [976.]

1840. BAER, K. E. VON. Untersuchung über die ehemalige Verbreitung und die gänzliche Vertilgung der von Steller beobachteten nordischen Seekuh (*Rytina* Ill.). <*Mém. de l'Acad. imp. des Sci. de St.-Pétersbourg*, vi^e^ sér., Sci. Nat., iii, 1840, 53–80. [977.]

1840. BENNETT, F. DEBELL. Narrative | of a | Whaling Voyage | round the Globe, | from the year 1833 to 1836. | Comprising sketches of | Polynesia, California, the Indian Archipelago, | etc. | With an Account of | Southern Whales, the Sperm Whale Fishery, | and | the Natural History of the Climates visited. | By | Frederick Debell Bennett, Esq. F. R. G. S. | Fellow of the Royal College of Surgeons, London. | In two Volumes. | Vol. I [-II]. | London: | Richard

1840. BENNETT, F. DEBELL—Continued.
Bentley, New Burlington Street, | Publisher in Ordinary to Her Majesty. | — | 1840. 2 vols. 8°. Vol. i, pp. i–xv, 1–402; vol. ii, pp. i–vii, 1–395. Map, woodcuts, and a fronticepiece plate to each volume.

Vol. i contains a Zoölogical Appendix, nearly 100 pp. of which are devoted to Cetaceans, to wit:

Chap. I. General Remarks on Whales, pp. 145–152. Chap. II. Whales of the Southern Oceans (general and anatomical description of the Cachalot, or Sperm Whale ["*Catodon macrocephalus*, Lacep."], its diseases, deformities, and parasites), pp. 153–170, fig. Chap. III. Natural history and habits of the Cachalot; Geographical distribution of the species; Natural indications of its places of resort, pp. 171–183. Chap. IV. Historical notice of Sperm Whale Fishery; commercial details; equipment of vessels, etc., pp. 184–201. Chap. V. Pursuit and capture of the Sperm Whale, pp. 202–212. Chap. VI. Dangers of the Sperm Whale Fishery, pp. 213–222. Chap. VII. Commercial products of the Sperm Whale Fishery, pp. 223–228. Chap. VIII. Southern Whales (concluded), pp. 229–241.—*Balæna Australis*, Desm., pp. 229–231. *Balænoptera* sp. (Humpback of southern whalers), pp. 231, 232. *Phocæna* sp. (Black Fish of South Sea whalers), pp. 233–235, fig. *Delphinus Peronii* Lacép., pp. 235–237, fig. *Delphinus delphis*, pp. 237, 238. The Grampus, p. 238. Fin-backs, Cow-fish, and Killers, pp. 239–240.

There are also in vol. i various references to Sperm Whales and other Cetaceans, relating mainly to their capture. [978.]

1840. CHRISTOL, J. DE. Recherches sur divers ossemens fossiles attribués par Cuvier à deux espèces d'Hippopotames et rapportés au Métaxytherium, nouveau genre de Cétacés de la famille des Dugongs. <*Rev. zool.*, 1840, p. 283.

Résumé par d'auteur d'un mémoire de ce titre. [979.]

1840. CHRISTOL, J. DE. Recherches sur divers ossements fossiles attribués par Cuvier à deux Phoques, au Lamantin, et à deux espèces d'Hippopotames, et rapportés au Metaxytherium, noveau genre de Cétacé de la famille des Dugongs. <*L'Institut*, 8ᵉ ann., no. 552, 24 sept. 1840, pp. 322, 323.

Résumé. [980.]

1840. CONRAD, T. A. On the Geognostic position of the Zeuglodon, or Basilosaurus of Harlan. <*Am. Journ. Sci. and Arts*, xxxviii, 1840, pp. 381, 382. [981.]

1840. [DANA, RICHARD H., *Jr.*] Two Years | Before the Mast. | A | personal narrative of | Life at Sea. | — | . . . [=poetry, 6 lines.] | — | New York: | Harper & Brothers—82 Cliff Street. | — | 1840. 12°. pp. 1–482.

Breathing of "shoals of sluggish whales and grampuses," near Falkland Islands, described, p. 36. Whales off San Pedro, Lower California, pp. 169, 170.

There are numerous later editions. In that of 1876, the passages above cited occur at pp. 30 and 156, 157. [982.]

1840. DENNY, HENRY. Sketch of the Natural History of Leeds and its vicinity for Twenty Miles. <*Ann. and Mag. Nat. Hist.*, v, July, 1840, pp. 382–396.

Occurrence of *Delphinus Phocæna* and *Delphinus Orca*, recorded, p. 386. [983.]

1840. EDITORS. [Notice of an extinct Dolphin, Delphinus karsteni, Von Olbers.] <*Ann. and Mag. Nat. Hist.*, v, May, 1840, p. 151.

Based on a skull from near Bünde, Westphalia. [984.]

1840. EICHWALD, ED. Notice sur l'opuscule qui a pour titre: Le Monde primitif de la Russie. <*Bull. de la Soc. imp. des Nat. de Moscou*, 1840, pp. 473–487.

Delphinus priscus, pp. 474, 481–483. [985.]

1840. EICHWALD, EDUARD. Die | Urwelt Russlands, | durch Abbildungen erlæutert | von | Eduard Eichwald, | der Phil., Med. und Chir. Dʳ, Akademiker und gelehrten Secretarien | der St. Petersburgischen Med. Chir. Akademie u. s. w. | Erstes Heft. | — | Aus den Schriften der kaiserlichen St. Petersburgischen mineralogischen Gesellschaft besonders abgedruckt. | — | Mit 4 lithographischen Tafeln. | — | Aus dem russichen uebersetzt. | — | St. Petersburg. | Gedruckt in der Druckerei des Journal de Saint-Pétersbourg. | — | 1840. 4°. ll. 2, pp. 1–106, pll. i–iv.

II. Beschreibung einiger Knochen des *Ziphius priscus*, pp. 25–53, pll. i, ii (Wirbelbeine, zwei Bruchstücke des Unterkiefers, ein Bruchstück der ersten Rippe, und Fingerknochen).

Ziphius priscus, sp. n. [986.]

1840. ESCHRICHT, [D. F.]. [Over Delphinernes og Sælhundes Karsystemer.] <*Förhandlingar vid det af Skandinaviska Naturforskare och Läkare hållna Möte i Göthberg* år 1839 (1840), pp. 135, 136. [987.]

1840. GOSSE, P. H. The | Canadian Naturalist. | A Series of conversations | on the | Natural History of Lower Canada. | By | P[hilip]. H[enry]. Gosse. | Cor. Mem. of the Nat. Hist. Soc. of Montreal, and of the | Lit. and Hist. Soc. of Quebec. | [Vignette.] "Every kingdom, every province, should have its own monographer." | Gilbert White. | Illustrated by forty-four Engravings. | London: John Van Voorst, 1, Paternoster Row. | M. DCCC. XL. 8°. pp. i-xii, 1-372.

Observations on the habits of *Delphinus canadensis* (=*Beluga catodon*) and *D. delphis* at pp. 171-174. [988.]

1840. GRATELOUP, [J. P. S. DE]. Description | d'un fragment de machoire fossile, | D'un genre nouveau de reptile (Saurien), de taille gigantesque, | voisin de l'Iguanodon, trouvé dans le Grès marins, à Léognan, | près Bordeaux (Gironde); | Par le docteur Grateloup. 8°. pp. 1-8, 1 pl. [Bordeaux, le 1 mai 1840. Imprimerie d'H. Gazay, rue Gouvion 15.]

Squalodon, gen. n., p. 8. This is the original place of description of the genus *Squalodon*, here regarded as Saurian, but later identified as Cetacean, and the basis of the *Squalodon grateloupi*, auct. [989.]

1840. GRATELOUP, [J. P. S. DE]. Considérations générales sur la Géologie et la Zoologie fossile de la commune de Léognan, près Bordeaux. Discours prononcé à l'occasion de la fête linnéenne célébrée le 25 juin 1840. <*Act. Soc. linn. de Bordeaux*, xi, 1840, pp. 335-346.

Squalodon, gen. n., p. 346. Also refers to the occurrence of remains "des Dauphins et autres Cétacés." [990.]

1840. HARLAN, [RICHARD]. [On the Discovery of the *Basilosaurus* and the *Batrachiosaurus*.] <*Proc. Geol. Soc. Lond.*, i, 1840, pp. 23, 24.

Abstract. [991.]

1840. HERAUSGEBER. E. Eichwald: die Urwelt *Russlands* durch Abbildungen erläutert, Heft I, 73 SS, 8° mit 4 lithogr. Tafeln, auf Kosten der mineralog. Gesellsch. in Petersb. 1840. <*Neues Jahrb. für Mineral., Geogn., Geol. und Petrefakt.*, 1840, pp. 731, 732.

Notiz. [992.]

1840. HERAUSGEBER. G. D. Bruno: Beleuchtung eines neuen fossilen Cetaceum. (Mem. d. Accad. di Turino, Class. Mat. Fis. B, 1 [20 Seiten] tab. 1, 2.) <*Neues Jahrb. für Mineral.*, 1840, pp. 496-501.

Auszug. [993.]

1840. HERAUSGEBER. Harlan: über einige fossile Wirbelthiere Nord Amerika, (Bullet. géol., 1839, x, 89, 90). <*Neues Jahrb. für Mineral.*, 1840, pp. 741, 742.

Enthält Bemerkungen über *Basilosaurus*, p. 741. [994.]

1840. JOHNSON, [H.]. Ueber den flaschennasigen Walfisch (*Hyperoodon*). <*Froriep's Neue Notizen aus dem Gebiete der Natur- und Heilkunde*, xv, No. 4, Juli 1840, p. 58.

External measurement, etc., of a specimen taken near Liverpool. [995.]

1840. JOHNSON, HENRY. Bottle-nosed Whale. <*Ann. and Mag. Nat. Hist.*, v, Julys 1840, pp. 361, 362. Communicated, with a note, by Wm. Thompson.

Description of a specimen of *Hyperoodon butzkopf* taken near Liverpool, Feb., 1840. [996.]

1840. KAUP, J. J. Notizen über die fossilen sogenannten Gras-fressenden Wale. <*Neues Jahrb. für Mineral.*, etc., 1840, pp. 673-676.

Gegen Christol (*Ann. des Sci. nat.*, 1834, ii, 257) über den Cuvierschen *Hippopotamus medius* und *H. dubius*. Synonymie von *Halitherium Cuvieri* Kaup und *Halicore Cuvieri* Christol, p. 675.

Pontotherium, gen. n. = *Cheirotherium* Christol, ein schon vergebenen Name. *Manatus fossilis* Cuvier = *Pugmeodon Schinzii* Kaup. [997.]

1840. KEYSERLING, A. GRAF, *und* J. H. BLASIUS. Die | Wirbelthiere | Europa's. | Von | A. Graf Keyserling und Professor J. H. Blasius. | — | Erstes Buch: | Die unterscheidenden Charactere. | — | Braunschweig, | Druck und Verlag von Friedrich Vieweg und Sohn. | — | 1840. 8°. ll. 4, pp. i–xcviii, 1–248.

Systematisches Verzeichniss der Europäischen Säugethiere, pp. i–xxiv. *Cetacea*, pp. xxii–xxiv, spp. 158–175 = 18 spp.

Erstes Buch. Die unterscheidenden Charactere, pp. 1–248. Säugethiere, pp. 3–75. Cetacea, pp. 72–75. Genn. 57–65, spp. 158–175. **1.** *Delphinorhynchus coronatus*; **2.** *D. micropterus*; **3.** *D. Delphis*; **4.** *D. rostratus*; **5.** *D. Tursio*; **6.** *Phocaena communis*; **7.** *Ph. Orca*; **8.** *Ph. Melas*; **9.** *Ph. Rissoana*; **10.** *Ph. grisea*; **11.** *Delphinapterus Leucas*; **12.** *Heterodon diodon*; **13.** *H. Desmarestii*; **14.** *Ceratodon Monodon*; **15.** *Physeter macrocephalus*; **16.** *Balaenoptera longimana*; **17.** *B. Boops*; **18.** *Balaena Mysticetus*. [998.]

1840. [LANMAN, JAMES H.]. The American Whale Fishery. <*Hunt's Merchants' Mag.*, iii, 1840, pp. 361–394, cuts.

An outline history of the Whale fishery as conducted in the United States, recounting its origin and progress, with an account of modes of capture (giving cuts of the implements used), and the preparation of the products. [999.]

1840. MEYER, HERM. V. [Ueber *Halianassa*-Reste.] <*Neues Jahrb. für Mineral.*, etc., 1840, p. 587 (6 Zeilen). [1000.]

1840. MEYER, HERM. V. [Ueber *Cheirotherium* Bruno und *Squalodon* Grateloup.] <*Neues Jahrb. für Mineral.*, etc., 1840, pp. 587, 588.

Cheirotherium subapenninum ist *Halianassa* (=*Halitherium*). *Squalodon* ist nicht ein Saurier-Genus, wie Grateloup glaubt, aber ein fleischfressenden Zetazeen. [1001.]

1840. NORDMANN, ALEXANDER VON. Voyage | dans la | Russie Méridionale | et la Crimée, | par la Hongrie, la Valachie et la Moldavie. | Exécuté en 1837, sous la direction | De M. Anatole de Demidoff, | par MM. de Sainson, le Play, Huot, Léveillè, Raffet, Rousseau, de Nordmann et du Ponceau; | Dédié à S. M. Nicolas I^er^, Empereur de toutes les Russies. | Tome premier [-quatrième]. | [Arms.] Paris, | Ernest Bourdin et C^e^, Éditeurs, | 51, Rue de Seine Saint-Germain. | — | 1840[-1842]. 4 vols. 4°. Vols. i, iii, 1840; vols. ii, iv, 1842. Avec Atlas in fol.

Observations sur la Faune Pontique, [par A. von Nordmann], = vol. iii, 1840.—Catalogue raisonné des Mammifères de la Faune Pontique, *ibid.*, pp. 9–65.—*Cetacea*: **1.** *Delphinus Phocæna*, p. 64. **2.** *Delphinus tursio*, p. 65. **3.** *Delphinus delphis*, p. 65. [1002.]

1840. OWEN, RICHARD. Observations on the Teeth of the Zeuglodon, Basilosaurus of Dr. Harlan. <*Proc. Geol. Soc. Lond.*, i, 1840, pp. 24–28.

Abstract. [1003.]

1840. SCHINZ, H. Europäischen Fauna | oder | Verzeichniss der Wirbelthiere | Europa's | von | Dr. Heinrich Schinz | . . . [= titles, 8 lines.] | — | Erster Band. | Säugethiere und Vögel. | — | Stuttgardt. | C. Schweizerbarts Verlagshandlung. | 1840. 8°. pp. i–xxiv, 1–448.

Achte Ordnung . . . Cetasea (*sic*), pp. 90–96. **1.** *Delphinus Delphin* (*sic*), p. 91; **2.** *Delphinus Tursio*, p. 91; **3.** *Delphinus phocaena*, p. 91; **4.** *Delphinus griseus* Cuv., p. 92; **5.** *Delphinus Rissoanus*, p. 92; **6.** *Delphinus globiceps*, p. 92; **7.** *Delphinus Feres* Bonnat., p. 93; **8.** *Delphinus Dalei*, p. 93; **9.** *Delphinus Epiodon* (=*Epiodon Urganantus*, Rafin.), p. 93; **10.** *Delphinus leucas*, p. 94; **11.** *Monodon Monoceros*, p. 94; **12.** *Physeter Tursio*, p. 94; **13.** *Physeter macrocephalus*, p. 95; **14.** *Balaena physalus*, p. 95; **15.** *Balaena Boops*, p. 96; **16.** *Balaena musculus*, p. 96. [1004.]

1840. SERRES, MARCEL DE. [Note sur la découverte d'un squelette entier de *Metaxytherium*.] <*L'Institut*, 8^e^ ann., no. 360, 19 nov. 1840, p. 392. [1005.]

1840. SWEETING, R. H. Dimensions and Description of a supposed new species of *Balænoptera*, stranded at Charmouth Beach, February 5, 1840. <*Charlesworth's Mag. Nat. Hist.*, iv, 1840, pp. 341–343.

Balænoptera tenuirostris, sp. n. Account of its external characters and brief notice of its skeleton. [1006.]

1840. SWEETING, R. H. Notes relating to a female Rorqual Whale (*Balænoptera boops* of authors). <*Proc. Zoöl. Soc. Lond.*, 1840, pp. 11, 12. *Ann. and Mag. Nat. Hist.*, vi, Dec., 1840, pp. 301, 302.

Brief account of external characters and osteology. Communicated by W. Yarrell. [1007.]

1840. **Sweeting, R. H.** On a Species of Balænoptera stranded on Charmouth Beach. <*Ann. and Mag. Nat. Hist.*, vi, Sept., 1841, p. 72.

Correcting errors in former communications (see *Charles. Mag. Nat. Hist.*, iv, 1840, pp. 341–343) on the same specimen, and stating his conviction "that it is nothing more nor less" than the Rorqual, *Balænoptera boops.* [1008.]

1840. **Thompson, William.** Note on the Occurrence at various times of the Bottle-nosed Whale (*Hyperoodon Butzkopf*, Lacep.) on the coast of Ireland; and on its nearly simultaneous appearance on different parts of the British coast in the autumn of 1839. <*Ann. and Mag. Nat. Hist.*, iv, Feb., 1840, pp. 375–381.

Account of the capture of seven individuals at different times and places, with notice of habits, dimensions, etc. [1009.]

1840. **Thompson, William.** Additions to the Fauna of Ireland. <*Ann. and Mag. Nat. Hist.*, v, March and June, 1840, pp. 6–14, 245–257.

Notice of the occasional stranding of herds of *Delphinus melas*, Traill, p. 6. [1010.]

1840. **Vrolik, W.** Anatomische Bemerkungen über den nordischen Finnfisch (*Balænoptera rostrata*), welcher im Sept. 1835. zu Wyk aan Zee gestrandet ist. <*Isis von Oken*, 1840, pp. 370–372.

Auszug aus *Tijdschrift for natuurlijke Geschiedenis*, uitgegeven door van der Hoeven en de Briese, iv, 1837. [1011.]

1840. **Wilde, —.** Wie das Junge der Cetaceen, während es an den Zitzen hängt, athmen könne? <*Froriep's Neue Notizen*, xv, No. 316, Juli 1840, pp. 121, 122.

Beantworten der Frage. [1012.]

1840. **Yarrell, W.** *See* 1840. **Sweeting, R. H.**, title no. 1007.

1840–45. **Owen, Richard.** Odontographpy; | or, a | Treatise | on the | Comparative Anatomy of the Teeth; | their physiological Relations, Mode of Development, | and | Microscopic Structure, in the | Vertebrated Animals. | By Richard Owen, F. R. S. | . . . [=titles, 2 lines.] | Volume I. | — | Texte. | [Volume II | — | Atlas | containing one hundred and sixty-eight Plates.] | — | London: | Hippolyte Bailliere, Publisher, | Foreign Bookseller to the Royal College of Surgeons. | 219, Regent Street. | Paris: J. B. Baillière Libraire de l'Académie de Médecine. | Leipzig: T. O. Weigel, | 1840–1845. Roy. 8°. pp. i–xx, l. 1, pp. i–lxxiv, 1–655. Atlas, Roy. 8°. pp. 1–37, pll. 1–150, + 1bis, 2bis, 62bis, 62ter, 63bis, 63ter, 64bis, 64ter, 65bis, 65ter, 70bis, 73bis, 75bis, 87bis, 89bis, 113bis, 119bis, 122bis = 168.

Teeth of Cetacea, pp. 345–372, pll. lxxxvii, lxxxvii A., lxxxviii, lxxxix, lxxxix A., xci–xcvii (includes *Sirenia*). Pl. lxxxvii, Narwhal, skull, two examples, male and female, from below, after Home. Pl. lxxxvii A., *Balænoptera boops* ("*Balæna*" on plate), fig. 1, alveolar groove of fœtal specimen, figg. 2–6, teeth, nat. size, from Eschricht; fig. 7, *Platanista*, lower jaw, and two detached teeth, the latter nat. size. Pl. lxxxviii, fig. *Hyperoodon*, beak from below, fig. orig.; fig. 2, *Delphinus delphis*, part of lower jaw, fig. orig. Pl. lxxxix, Cachalot (*Physeter macrocephalus*), lower jaw and teeth, figg. orig. Pl. lxxxix, *ibid.*, mag. sections of tooth, fig. orig. Pl. xci, *Zeuglodon cetoides*, mag. sections of tooth, figg. orig.

Sirenians, pp. 364–372, pll. xcii–xcvii; *Halicore*, pp. 364–371; *Manatus*, p. 371; *Halitherium*, p. 372. Pl. xcii, Dugong ("*Halicore indicus*"), lower jaw, fig. orig. Pl. xciii, *ibid.*, fig. 1, upper jaw; fig. 2, part of lower jaw; figg. 3–6, teeth; figg. from Home. Pl. xciv, *ibid.*, transverse section of molar, fig. orig. Pl. xcv, *ibid.*, section of tusk, fig. orig. Pl. xcvi, figg. 1–3, *Manatus americanus*, teeth. Pl. xcvii, *Halitherium brocchii*, fragment of upper jaw, part of lower jaw, and detached teeth. [1013.]

Art. XIX.—New Moths, with Partial Catalogue of Noctuæ.

By A. R. Grote, A. M.

From the tender green of the young grass in spring time, to the hard and brilliant red of the autumn leaf, the moths carry upon their wings nature's palette, full of colors the most various and beautiful. Like flying flowers, stem-forsaking when the sun takes the day from the circling earth, they haunt the darkness with unquiet wings. The human mind dwells with pleasure, from an æsthetic point of view, upon their various tints and forms. As objects of scientific inquiry, they are interesting for the curious changes they undergo and for their structure and habits. In studying their distribution we find that they depend upon soil, vegetation, and climate, and that they even suggest and confirm observations made upon the probable past condition of the earth's surface by their presence in particular localities. The importance of studying them is not diminished by their frail appearance and brief lives. Indeed, they have additionally attracted a class of writers whose minds seem to be fitted for very different occupation, and it is to be hoped that they may even succeed in giving a fresh illustration of the fairy tale of Beauty and the Beast.

TRIPUDIA BASICINEREA n. s.

Head, thorax, and base of fore wings gray. Primaries washed out, wardly, beyond the middle, with light leather brown. A media curved. broad, velvety black line, broken above. Reniform round, concolorous, a little paler brown. Subterminal line irregular, waved, fuscous. A dark brown terminal line. A pale line at base of blackish fringes. Costal dots. Hind wings pale fuscous; beneath stained with ochery, with double, vague, common lines. Arizona, B. Neumoegen. *Expanse* 20 mil.

Larger than the two other species *quadrifera* of Zeller and *flavofasciata* of Grote. The latter is probably described recently by Mr. Hy. Edwards as *Oribates versutus.*

EUCLIDIA INTERCALARIS n. s.

♀. Gray, dusty, color of *erechtea.* Fore wings with four median trigonate black patches separated by the veins, and a median gray shade broadening below where it joins the pale, even t. p. line which is near the margin. Subterminal line even, pale, near the margin. On s. t. field two or three costal black dots and a black line above internal angle. A black dash on internal margin near the base. Hind wings fuscous gray, with two exterior pale lines. Body gray. The median vein and the spaces between veins 3 and 5 on median space of primaries shaded with gray. Beneath gray without markings.

New Mexico, Professor Snow, No. 874. *Expanse*, 31 mil. The four median black patches are unequal in size and shape.

PYRRHIA Hubner.

Dr. Speyer is with myself of opinion that this is a valid genus, the species differing decidedly from *Chariclea*, in vestiture and armature. While there is but one European species, we have three from the territory east of the Rocky Mountains. These are: *Exprimens* Walker (Bull. B. S. N. S. II, pl. III, fig. 5), which seems to stand nearest the European form; *Angulata* Grote (*id.* loc. fig. 6), which has been comparatively described by Dr. Speyer under the name of "Exprimens"; and *Stilla* Grote (North American Entomologist I, 45), which is the largest, handsomest, and most intensely colored. The pattern of ornamentation is the same in all four forms, while our two species of *Chariclea*, Triangulifera, and Pernana, have a very different style of marking and exactly follow the European type of the genus, *Delphinii*.

EULINTNERIA n. g.

The neuration is given, Trans. Am. Ent. Soc., 1872, 106. Male with a cut in the primary wing on outer margin; female with entire wings. Male antennæ simple, ciliate; palpi three times as long as the "front," curved upwards. Ocelli present. "Front" flat. Eyes naked and legs unarmed, as always in the Deltoids. Professor Lintner suggests that our species does not belong to Tortricodes, and, in this opinion, I name the genus for him. Type: *Tortricodes bifidalis* Grote.

Geometridæ.

EUCATERVA VARIARIA Grote.

This geometrid genus and species, which I have elsewhere characterized, I again call attention to on account of the difference in the length of the male and female labial palpi. In both sexes they are longer than usual in the group, in the male, longer, curved, projecting upwards and forwards, linear, closely scaled, ringed black and white. In the female, similar in appearance, shorter, pointed, and perhaps slenderer. The body is rather stout; the female abdomen thick and vermiform. The species seems to be allied to *Caterva catenaria*, a species I am unwilling to refer to *Zerene*, but which Dr. Packard has characterized under this name, which belongs to a European species, differing structurally in my opinion. *Catenaria* is numerous in the fall as a moth, and has been mistaken for the white cabbage butterfly by unskilled observers. It is a pretty moth; the larva feeds on weeds not of economical importance. *Eucaterva variaria* is smaller, more like *Cleora pulchraria* in size. The male is white, speckled, and clouded with fuscous, the dark shades forming two mesial bands on the forewings, which leave the costal region white and freer from black speckles. The outer blackish band is straight; the inner curved. There is a black discal mark. Singularly enough, as I have stated, there are two varieties of the female. The male antennæ are feathered, the female simple. One of the varieties is white with black dots sparsely and irregularly displayed, massing a little on exterior border, and with the fringes (as in the male) black dotted. The other form has a black shade extending over primaries, leaving the costal region white, as also the inner margin. The body is white. There are no ocelli. The female antennæ fine and blackish. The white thorax shows some black speckles, especially on the collar. This Arizonian insect, taken at Tucson, and of which Mr. Neumoegen's collection contains many examples, is one of the most interesting Geometrids recently discovered.

The following are the additions to our list of the North American species of *Agrotis* given in Bull. U. S. Geol. Surv. vol. vi, No. 1:

Pastoralis Grote, Can. Ent. 7, 68. Vanc.; Colo.; Arizona.

N. B.—Accidentally omitted from the former list.

Quarta Grote, Bull. U. S. Geol. S., vi, 258. California.
Washingtoniensis Grote, Bull. U. S. Geol. S., vi, 259. Washington Ter.
Immixta Grote, Bull. U. S. Geol. S., vi, 259. Texas.
Docilis Grote, Bull. U. S. Geol. S., vi, 259. Colorado.
Viralis Grote, Bull. U. S. Geol. S., vi, 260. Nebraska.
Semiclarata Grote, Can. Ent. 13, 132. Washington Ter.
Colata Grote, Can. Ent. 13, 131. Oregon.
Esurialis Grote, Can. Ent. 13, 131. Washington Ter.
Nanalis Grote, Can. Ent. 13, 131. Nevada; Montana.
Repentis G. and R., Trans. Am. Ent. Soc. 1, pl. 7; *Agr. Cochranii* Riley. Eastern and Middle States to California.

N. B.—This must be a distinct species from *Messoria* of Harris, as I have shown Papilio 1, 126.

Messoria Harris, Ins. Inj. Veg. 1st ed. 324. "Massachusetts."
Havilæ Grote, Papilio 1, 76; Butler, *id.*, 169. California.

N. B.—I have shown that this form is most probably distinct from our eastern *Clandestina*.

Clodiana Grote, Papilio 1, 76. Washington Ter.

I append here the descriptions of Guenée's under *Agrotis*, not recognized by me, in the hope that it may lead to the identification of the species.

Agrotis spissa Guen., Noct. 1, 261.

This greatly resembles *Crassa*, but the species is smaller (35 mil.), of a grayish-brown testaceous, the veins darker and relieved by a slightly paler ground, especially the median and its last branch; markings like *Crassa*, but there is a great disproportion between the two stigmata; the t. p. line forms a dash entering below the fourth inferior nervule; and on the inner margin, below the submedian vein, it is elongated in such a way as to touch the top of the mark formed by the extra-basal line; the cuneiform marks of the s. t. line are more regular and more equal; the hind wings are darker and more uniform.

Am. Sept. Coll. Bdv. Two bad specimens.

Noctua ochrogaster Guen. Noct. 1, 237.

A little larger than *plecta*, which it resembles in markings. The red of the primaries is paler, the subterminal is well marked by a deep blackish shade. The terminal dots are rounded and separate; the fringe is cut by a dark line; the stigmata are larger; the reniform less constricted, and the median vein is equally white. The hind wings have a very distinct series of rounded terminal dots. The collar is ochery white, as also the abdomen, which is without any reddish anal tuft.

Am. Sept. Coll. Bdv. One male.

Noctua elimata Guen., Noct. 1, 333. 40 mil.

Fore wings pale ashen, much mixed with pale violaceous red, all the lines visible, of the former color, preceded and separated by shades of the latter tint, especially the subterminal line, which is very sinuous and irregular; the t. p. line is denticulate; the t. a. line forms three large teeth, all marked on costa by a deep brown mark. The two stigmata well defined, pale, separated inferiorly by a dark line; the orbicular contiguous to the t. a. line; the reniform large and regular, the terminal space ashen. Hind wings of a uniform dark gray with the fringe paler and more reddish. Beneath the four wings are reddish. Antennae of the male strongly pectinate. Female larger but similar. Georgia. Coll. Doubleday. Caterpillar having nearly the same colors as the moth, that is to say, the dorsal region and subdorsal are reddish, the lateral ashen, without well defined lines, and only showing some slightly darker subdorsal markings. Head ocher yellow. Collar dark brown. Feet concolorous. Abbot represents it on chrysanthemum. Chrysalis light red, with the membrane covering the wings mixed with greenish.

Agrotis tesselloides n. s.

This is the Californian representative of *tessellata*; of this latter I am indebted to Professor Lintner for a series of nine selected specimens showing its range of variation. Six specimens of *tesselloides* agree among themselves and differ by the paler, more purply gray tint of the primaries without black shading on cell (as to which *tessellata* varies) and the hind wings are of a more uniform tint throughout. The gray, discolorous stigmata are smaller, the transverse lines more distinct, the t. a. more waved. A single specimen differs by the very large stigmata, the orbicular lying over costal region to edge, the median shade marked on cell, the collar dark in front; it may be a distinct species. *Tesselloides* is the same size as its Eastern ally, and Mr. Edwards's number for the Havilah specimens is 6513. The variety is numbered 6544.

Agrotis pellucidalis n. s.

This form is closely allied to *rudens*, but differs by the absence of the longitudinal black dashes on fore wings. Hind wings pellucid white. Head and base of collar ochery. Fore wings pale brownish, with the markings in blackish fuscous. T. a. line black, interrupted, perpendicular, with the concolorous clariform faintly outlined attached. Half line double, black, divided by a diffuse pale shade in the middle. T. p. a double series of black venular dots, the inner series partially connected by a dentate black line. Reniform with an interior fuscous black solid lunule. Costa dark shaded. Terminal space dark, intruding twice on the pale ground color, opposite cell and again about internal angle. A dark costal mark before s. t. line. Fringes dotted with fuscous. *Expanse*, 30 mil. *Hab.*—Texas.

The relationship of this smaller species with *annexa* and *malefida* is evident. The color of the head is not uniform in the two specimens before me.

I have given, in the last volume of this bulletin, an extract from the new list of North American Noctuidæ on which I am at work. I here correct that and continue to the genus *Apatela*. This latter genus will undoubtedly be found to include diverse types as soon as the larva are known and studied in connection with the perfect insect. I have given, in the Bulletin of the Buffalo Society of Natural Sciences, vol. 1, p. 78, an outline of some of these divisions. We shall probably use *Triæna* for the type of *psi*, *occidentalis*, *tritona*, *grisea*, *lobeliæ*, etc.; *Acronycta* must be used for species congeneric with the European *leporina; Megacronycta* for *Americana; Apatela* for species congeneric with the European *aceris; Lepitoreuma* for our *ovata* and allies, *Jocheæra* for *funeralis*, while *Eulonche* must be used for *oblinita*, *lanceolaria* and *insolita*. To this latter group *xyliniformis* and *edolata* are related. Other types will be probably afforded by *spinea*, *innotata*, and *brumosa*. I do not agree with Mr. Butler that any of these insects are *Bombycidæ;* the larvæ affect Bombycidous types, but I believe that in this group the free embryonic stages have submitted to independent variation, while the gray colors and habits of the perfect insects have proved sufficiently useful to be conserved. Before this division can be made, comparison with European forms must be entered on and decided characters in the moths must be discovered.

I have recently again catalogued the N. Am. *Bombyciæ* (which precede the *Nonfasciatæ*) in the pages of the "Canadian Entomologist," and either in this magazine or the "Bulletin of the U. S. Geol. Survey," or in "Papilio," I have given lists of the principal genera of *Nonfasciatæ*, so that there is a good deal of material on hand for the issuance of the New List of the Family. Such genera catalogued by me are, for instance, *Oncocnemis*, *Hadena*, *Mamestra*, *Polia*, *Agrotis*, *Plusia*, *Graphiphora*, *Eustrotia*, *Spragueia*, *Thalpochares*, *Tarache*, etc. In the list of *Agrotis* (Bull. U. S. Geol. Surv. 6, p. 158) there should be a section sign (§) after *digna*. This list, while as complete as I could make it, is not intended as the best with regard to the *arrangement* of the species; the only name I have been able to find omitted is *pastoralis*.

NOCTUÆ Linn.

NONFASCIATÆ Borkh.

DICOPINÆ.

In this section are grouped genera with the head sunken, squamation rough or thick, male antennæ pectinate, legs unarmed except fore tibiæ, which have a stout claw, eyes naked, labial palpi short, ocelli present. The species appear usually early in the year; the chrysalis hibernates.

EUTOLYPE Grote (1874).

Rolandi Grote, Proc. Acad. Nat. Sci. Phil. 198, 1874; *Copipanolis vernalis* Morr. P. B. S. N. H. 133, Dec. 1874. Eastern States to Texas.

DICOPIS Grote (1874).

Muralis Grote, 6th Ann. Rep. Peab. Acad. Sci. 27. Eastern States to Texas.

Electilis Morr. Pr. Bost. S. N. H. 115, Oct. 1875. Penn. The type is in Mr. Tepper's coll.; it seems very close to *Muralis*, but I have not compared the two.

Thaxterianus Grote, Bull. B. S. N. S. 2, 196. Massachusetts; Texas.

Damalis Grote, Bull. U. S. Geol. Surv. 5, 208. California.

Depilis Grote, Papilio, 1, No. 4. Massachusetts; Ohio.

COPIPANOLIS Grote (1874).

Cubilis Grote, 6th Ann. Rep. Peab. Acad. Sci. 30. Eastern States to Texas.

BOMBYCOIDEA.

AUDELA Walker.

Acronyctoides Walk., Can. Nat. Geol. 6, 37; Grote, Can. Ent. 9, 27; *Panthea leucomelana* Morr. Proc. Ac. N. S. Phil. 428, 1875; Grote, B. U. S. G. Surv. 4, 169. Canada; Western N. Y.; Maine.

PLATYCERURA Packard (1864).

Furcilla Pack., Proc. Ent. Soc. Phil. 374, 1864. Larva on White Pine, Lintn. Ent. Con. 3, 131, with figure. Canada; Eastern and Middle States.

CHARADRA Walker (1865).

Propinquilinea Grote, Trans. Am. Ent. Soc. 4, 293, pl. 1, fig. 96; Goodell. Papilio, 1, 15. Eastern and Middle States; larva on the White Birch and Walnut.

Deridens Guenée, Noct. 1, 35, pl. 3, fig. 8; *Acronycta circulifera* Walk., 709; *Charadra contigua* Walk. Sup. 446; G. & R. Trans. Am. Ent. Soc. 2, 86; Lintn. Ent. Con. 3, 157 (larva). Canada to Southern States. Larva on Oak (Thaxter).

Dispulsa Morr. Proc. Bost. Soc. N. H. 213, 1875. Texas.

Palata Grote, Can. Ent. 12, 258; ♀ Papilio, 1, 153. Colorado; Arizona.

RAPHIA Hübner (1816).

Abrupta Grote, Proc. Ent. Soc. Phil. 2, 336, pl. 8, fig. 3, 1863. Eastern and Middle States.

Frater Grote, Proc. Ent. Soc. Phil. 2, 435, pl. 9, fig. 7, 1864; *Saligena personata* Walk. Sup. 606 (1865). Eastern and Middle States. Larva on Poplar (Thaxter).

FERALIA Grote (1874).

Jocosa Guenée, Noct. 1, 37; Grote, B. B. S. N. S. 2, 58. Eastern and Middle States. Varies by being suffused with black.

MOMAPHANA Grote (1875).

Comstocki Grote, B. B. S. N. S. 2, 59; Stett. Ent. Zeit. 195, 1875. New York; Buffalo, collected by Prof. Kellicott.

DIPHTHERA Hübner.

Fallax H.-S. Exot. 80, fig. 211. Eastern, Middle, and Southern States.

HARRISIMEMNA Grote (1873).

Trisignata Walk., C. B. M. Noct. 29; *Notodonta sexguttata* Harris in Ent. Cor. pp. 174–5, figs. 24–5. The curious larva, with long thoracic hairs, and a habit of vibrating the body, from which it is called the "zig-zag" caterpillar, lives on lilac, and bores into wood to pupate, covering up the orifice by which it entered, so that it is not noticed. Canada to Middle States.

CERMA Hübn. (1818).

Cora Hübn., Zutr. 14, figs. 59, 60. Canada to Georgia. Is this Guenée's *Chariptera festa?* Guenée does not know this; he makes *hebraea* the type of *Grammophora*, but thinks *cora* may prove congeneric, and so includes it. *Grammophora* falls before *Polygrammate* according to the rule of priority. The difference seems to me unessential between this and *Bryophila*, but *Cerma cora* and *Harrisimemna trisignata* are structurally distinct and differ from *Bryophila* or *Polygrammate*. The dark lines on the paler ground of the primaries give rise to the idea of relationship, which has caused authors to use *Grammophora* in a wide and loose sense. I do not see how the term can be retained for any species, but if used it must be at the expense of Hübner for his species. Walker incorrectly referred *trisignata* to it, a moth whose habits, larva, and structure are quite peculiar, and unlike any other member of the group. Harris called the species a Notodontian; his name, though given earlier, was not issued until after Walker's, in his posthumous papers. I have named the genus after him, and to still further ally his name with the insect, which he was the first to at all adequately observe, I propose to call the species *Harris's Zigzag moth*, in the vernacular.

POLYGRAMMATE Hübn. (1816).

Hebraicum Hübn. Zutr. 1, 10, figs. 25–6; *Grammophora hebræa* Guen., Noct. 1, 30, pl. 3, fig. 5. Middle States.

MICROCOELIA Guen. (1852).

Fragilis Guen., Noct. 1, 34. Canada to Middle States.

Diphteroides Guen., Noct. 1, 34; Grote, Proc. Ent. Soc. Phil. 3, 78, pl. 2, fig. 2; G. & R., Tr. Am. Ent. Soc. 2, 195, pl. 3, fig. 69.

var. *Obliterata* Grote, Proc. Ent. Soc. Phil. 3, 79; G. & R., Tr. Am. Ent. Soc. 2, 195, pl. 3, fig. 70. Canada to Alabama.

BRYOPHILA Tr.

Lepidula Grote, 6th Ann. Rep. Peab. Ac. Sci. 27. Canada to Middle States.

† *Corticosa* Guen., Noct. 1, 30.

"Size of *glandifera*. Fore wings dense, squamous, varied with greenish white, light brown and black, and the lines all black. Basal space of the first color, with the half-line and a spot on internal margin black. Median space brown gray, slightly mixed with fulvous (fauve) on the disc; terminal space white, spotted with brown. Subterminal line very black, and very much waved, and nearly parallel with the transverse posterior line. Fringe whitish, cut with black marks. Hind wings nacreous white, with a blackish shade commencing at anal angle and hardly reaching over half of the border. Abdomen white beneath. Body rather stout. Antennæ long. Two specimens. Coll. Bdv. Am. Sept." This description, which I have translated, will not apply to any form known to me. It is opposed to *lepidula* both in color and markings of fore wings and color of hind wings.

Teratophora H.-S., Exot., fig. 213; *Erastria inscripta* Walk., C. B. M. Noct. 808. Canada to Middle States.

Nana Hübn., Zutr. 1, figs. 53–4. "Georgia."

CHYTONIX Grote (1874).

Palliatricula Guen., Noct. 1, 26. Canada to Middle States.

Iaspis Guen., Noct. 1, 209; Grote List, 14. Same localities as *Palliatricula*, of which it may be the ♂ or a varietal form; notwithstanding Guenée's separation the two are closely allied.

Sensilis Grote, Papilio 1, 49. Eastern and Middle States. This genus is more robust and hadeniform than *Bryophila*, the body tufted; the thoracic scales are flattened, not like *Hadena* in this respect. It is peculiar from the white dot attached to t. p. line, in *Palliatricula* absorbed by the white shade of median space.

APATELA Hübn., Tentamen.

§ *Triæna* Hübn. (1816).

Occidentalis G. & R., Proc. Ent. Soc. Phil. 6, 16. Canada to Southern States. Represents in our fauna the European *Psi;* the larva has been described by Mr. Saunders, and is quite distinct.

Morula G. & R., Tr. Am. Ent. Soc. 2, 196, pl. 3, fig. 75; Lint. Ent. Con. 3, 137 (larva). Apple. Canada to Middle States.

Lobeliæ Guen., Noct. 1, 44; Coquill., Papilio 1, 6 (larva). Burr Oak. According to Guenée, Abbot represents the larva on *Lobelia.* Guenée describes from specimens, and his description agrees with our species, but not the larva. Texan specimens are large, and sometimes with a faint ocher tinge to the primaries. This is the largest of the group, but not so stout as *Americana* and allies. Canada to Texas.

Thoracica Grote, N. Am. Ent. 1, 94. Colorado.

Furcifera Guen., Noct. 1, 44. Middle and Eastern States.

Hasta Guen., Noct. 1, 45. Middle and Eastern States.

† *Telum* Guen., Noct. 1, 45.

"This resembles the two preceding species, but is more oblong, and the markings of the hind wings below is very different. 45 mil. Fore wings narrow, oblong, produced at apices, of an ashen gray much obscured by powdering, the median lines separate, fine, the stigmata tied and only well marked inferiorly. The fringe neatly cut. Hind wings of a very dirty whitish gray, a little iridescent, the margin and the veins much stained with black, beneath of a slightly nacreous white, with a basal dash, a strong cellular spot, a thick interrupted line, and distinct terminal dots, all black. One male. Am. Sept." I do not identify this description.

† *Spinigera* Guen., Noct. 1, 45.

"Shape and appearance of *Furcifera.* Fore wings of an ash gray powdered with blackish, with the markings indeterminate. Basal line very fine and joining the extra-basal. Orbicular small, rounded. Reniform very large, soiled with blackish. T. p. line well marked, denticulate, black, fine, but shaded largely although vaguely with brownish; a series of small terminal points. Fringe hardly cut. The inferior transversal dash running to a fine point but more visible than the rest. Hind wings of a yellowish gray, nearly concolorous, beneath yellowish white, with a discoidal line and the lunules little marked. New York. Coll. Doubleday. Two males in bad condition, which perhaps renders the above description incomplete." In collections the name "*Spinigera*" is attached to specimens which are probably the same as *Pallidicoma,* which has the t. p. line denticulate, but acutely so, and shaded with white, and belongs to a different group from this which Guenée puts in his genus *Semaphora* the equivalent of *Triœna.*

Tritona Hübn., Zutr., 107–'8; Guen., Noct. 1, 42. Canada to Southern States.

Falcula Grote, Can. Ent. 9, 86; Coquill., Papilio 1, 6; Larva on hazel. This is distinguishable from *Tritona* by the bright brown edging of the thoracic tuft behind; the dash at internal angle does not cross or indent the transverse posterior line. In this it resembles *parallela.*

Grisea Walk., C. B. M. Noct., 56; ? *pudorata* Morr., Ann. N. Y. Lyc. 93, 1875. Canada to Middle States. Mr. Morrison thinks that Guenée's *tritona* may not be Hübner's. His description of *pudorata* agrees fairly with *grisea* as determined from notes of mine on the B. M. Coll. There is some variation probably in tone of secondaries, for Mr. Morrison calls the hind wings of *tritona* "yellow." My specimens have the wings different shades of fuscous, with, perhaps, a faintly yellowish tinge.

Parallela Grote, Can. Ent. 9, 53. Colorado; Texas.

Albarufa Grote, Proc. Bost. Soc. N. H., 239, 1874; *Walkeri* Andrews, Can. Ent. 9, 98. Eastern and Middle States.

† *Interrupta* Guen., Noct. 1, 46; Am. Sept. This is described with the caterpillar from a drawing of Abbot's. It would be a good thing if the drawings (which I believe are either in Boston or in the coll. British Museum), which have been made the basis of descriptions by Guenée, could be published. I hardly think the species can be recognized without such help.

Vinnula Grote, Proc. Ent. Soc. Phil. 2, 436, pl. 9. fig. 2. Canada to Middle States.

Paupercula Grote, Proc. Acad. N. S. Phil. 197, 1874. Texas.

§.

Harveyana Grote, Proc. Ac. N. S. Phil. 418, 1875. Middle States.
Clarescens Guen., Noct. 1, 54. Eastern and Middle States.
Connecta Grote, Bull. B. S. N. S. 1, 79. Middle States.
†*Longa* Guen., Noct. 1, 54.

§.

Innotata Guen., Noct. 1, 50; *Graefii* Gr., P. E. Soc. Phil. 2, 68, pl. 3, fig. 6. Eastern and Middle States.

§.

Dentata Grote, Can. Ent. Canada; Eastern States.

§.

Radcliffei Harvey, Bull. B. S. N. S. 2, 270. Eastern and Middle States.

§.

Quadrata Grote, Bull. B. S. N. S. 2, 154. Missouri; Nebraska. Mr. Dodge has, I believe, reared this fine species from the larva.

§ *Acronycta* Ochs. (1816).

Tota Grote, N. Am. Ent. 1, 10. Texas.
Felina Grote, Bull. U. S. Geol. Surv. 5, 208. California. Mr. Hy. Edwards probably describes the larva of this on p. 5 of his No. 16, found on Poplars.
Lepusculina Guen., Noct. 1, 46; *Populi* Riley, 2d Mo. Rep., 119 (larva). Middle and Western States.

§ *Megacronycta* Grote (1873).

Americana Harris, Ins. Ing. Veg. 1st ed. 317; 3rd ed. 435; *hastulifera* Guen., Noct. 1, p. 47. Harris describes the larva on elm, chestnut, and maple. Prof. Riley also describes it, and his description agrees well with Harris's. This larva agrees fairly with that figured by Abbot and Smith as identical with the European *Aceris* on pl. 93. I refer the student to Bull. Buff. Soc. Nat. Sci. 1, 154, for a discussion of the probably correct synonymy. What species is intended by Abbot under *hastulifera* is not known. Coquillett describes the larva of *Americana* found on Red Oak, Papilio 1, 6. Guenée's name *acericola* is based on the figure of the imago given by Abbot on pl. 93. Perhaps the larva varies, but it is strange if Abbot's two plates of *hastulifera* and *aceris* represent the same species. The imago which Abbot calls *hastulifera* looks in the figure like *Americana*, but the caterpillar does not agree with our descriptions.

Dactylina Grote, Proc. B. S. N. H. 16, 239. Canada to Middle States. This fine species is undoubtedly distinct from *Americana;* the hind wings of the female are white.

Insita Walk., C. B. M. Noct. 61. Eastern and Middle States. This is also a large species with the hind wings white in both sexes. The fore wings are also quite white; the dash at internal angle is variable as in *Americana.*

§. *Merolonche* Grote.

Spinea Grote, Bull. B. S. N. S. 3, 78, pl. 4, fig. 7. California. The egg and young larva are described by Mr. Hy. Edwards, p. 3 of his No. 26. This is a paler and slightly more compact species, head closely applied to the globose thorax, than *lupini*, from which it differs by the t. p. line being a little drawn in opposite the cell and a dash on median space crossing the shade on submedian fold.

Lupini Behr Ms., Grote, Bull. B. S. N. 1, 79; 3, pl. 4, fig. 10. California. This species is of a dark blue gray, the t. p. line more dentate and without the pale mark at internal angle and the submedian dark dash of *spinea.*

§ *Apatela* Hübn.

Rubricoma Guen., Noct. 1, 48. Western and Southern States. Guenée describes the larva, from an unpublished drawing, on a species of "*Rhus*."

Luteicoma G. & R., Tr. Am. Ent. Soc. 3, 179, pl. 2, fig. 83. Western and Middle States.

Pallidicoma Grote, Bull. U. S. Geol. Surv. 4, 169. Eastern and Middle States.

§.

Brumosa Guen., Noct. 1, 52; *Verrillii* G. & R., Tr. Am. Ent. Soc. 3, 178, pl. 2, fig. 82. Canada to Middle States.

Distans Grote, Can. Ent. 11, 38. Canada.

Subochrea Grote, Bull. B. S. N. S. 2, 153. New York; Canada. I have taken several specimens of this fine species near Buffalo, in June.

Superans Guen., Noct. 1, 53. Eastern and Middle States.

Persuasa Harvey, Bull. B. S. N. S. 2, 271. Eastern States to Texas.

Perdita Grote, Can. Ent. 6, 154. California.

Afflicta Grote, Proc. Ent. Soc. 2, 438, pl. 9, fig. 4. Middle to Southern States.

Noctivaga Grote, Proc. Ent. Soc. 2, 437, pl. 9, fig. 3. Canada to Middle States.

Jocheæra Hübn. (1816).

Funeralis G. & R., Proc. Ent. Soc. Phil. 6, pl. 4, fig. 10; *americana* Harris in Ent. Cor. 313, pl. 3, fig. 3 (larva); Lintn. Ent. Con. 3, 135, larva on Elm. This species represents the European *alni* in our fauna. The name *americana* is posthumous and of later date than *funeralis;* it is besides used for another species.

§*Lepitoreuma* Grote (1873).

Ovata Grote, Bull. B. S. N. S. 1, 80, pl. 2, fig. 14. Eastern and Middle States.

Exilis Grote, Proc. Acad. N. S. Phil. 197, 1874. Middle States.

Hamamelis Guen., Noct. 1, 52; Goodell, Can. Ent. 9, 61. Larva on Chestnut. Guenée gives the larva on *Hamamelis Virginiana.* His description is comparative with *Rumicis*. This species varies very much in color and somewhat in size. I have examined a very large series, but without finding intermediate specimens between it and the dark and smaller *increta* or the pale and still smaller *dissecta.*

Haesitata n. s.

Two specimens from Pennsylvania are as large as the largest *Hamamelis*, and differ by the primaries being of a purely dull and pale bluish gray without any admixture of yellowish or olivaceous. The usual dark shading on sub-basal and subterminal spaces is reduced to a minimum. The hind wings are very dark. The dash at base of primaries is reduced. This form is easily recognized but may not be a distinct species. In my collection.

Increta Morrison, Proc. Bost. Soc. N. H. 131, 1874. Eastern and Middle States.

Dissecta G. & R., Tr. Am. Ent. Soc. 6, 178. Canada to Middle States.

§*Arctomyscis* Hübn. (1816).

Sperata Grote, Bull. Buff. S. N. S. 1, 81, pl. 2, fig. 1. Eastern and Middle States.

§ *Mastiphanes* Grote.

Edolata Grote, Papilio 1, 153. Arizona.

This is one of the finest forms in the genus. It is larger than *xyliniformis*, shaded diffusely with dead black longitudinally on fore wings, which are cut by the whitish, strongly-toothed t. p. line. The hind wings are white. I have seen a large number of perfectly coinciding examples in Mr. Neumoegen's collection, to whom I am indebted for two types in my own. The tegulæ are shaded with black.

Extricata n. s.

♂ ♀. Hind wings white in both sexes, showing in the ♀ a slight indication of a mesial band marked on costa. Size, large; the ♂ expands 38, the ♀ 46 mil. Very close to *xyliniformis*, but with a fine basal dash; the mark at internal angle obsolete. The t. p. line is denticulate, white-edged, not shaded with black. The terminal black dashes distinct. The orbicular is moderate, ringed, concolorous; the reniform indistinct, shaded with dusky. The t. p. line is thrown out as in its ally. It is to be regretted that M. Guenée did not give fuller details, because there are several species in which the t. p. line is thrown out and the wings long. I have identified *xyliniformis*, which has been reared by Professor Riley, on account of the soiled hind wings of the

♀ and the strong internal dash. Three specimens from Texas, Belfrage. This may be in collections under Guenée's name. The basal dash is very fine, irregular; the tegulæ are edged within with blackish; this form is allied to *edolata*, and is more distinctly marked than *xyliniformis*. Belfrage's numbers are 68 ♂, 699 ♀.

Xyliniformis Guen., Noct. 3, 400; Riley, 5th Mo. Report, p. 126 (larva). Western and Southern States.

Lithospila Grote, Proc. Bost. Soc. N. H. 240, 1874; check list of Noct., pl. 1, fig. 2. Eastern and Middle States.

§*Euloncke* Grote (1873).

Oblinita Abb. & Sm. Ins. Ga. 2, 157, pl. 94. Southern States.

Mr. Thaxter has drawn my attention to the fact that the northern form may be distinct. Although I am not prepared to admit it, and it may be that the larva varies, careful breeding is needed to be quite sure of the name we give our northern species.

Lanceolaria Grote, Proc. Ac. N. S. Phil. 418, 1875. Massachusetts.

Insolita Grote, Bull. B. S. N. S. 1, 82. Pennsylvania.

Under the generic name *Cyathissa*, I would separate the *Bryophila percara* of Mr. Morrison from that genus on account of the notch in the external margin of primaries and the differing proportions, the narrower wings. It is evidently not congeneric with *Lepidula* and the European types of *Bryophila*. I restore Treitschke's name to this latter genus because Hubner's term has been diversely used, and to reintroduce it might cause confusion. I am prepared to surrender every point where a strict enforcement of priority might inure to the detriment of our science. I hope that the anti-Hubnerists will accept the few genera which I have felt obliged to introduce, such as *Lithophane*, which are unobjectionable in every way.

In explanation of my synonymy I draw attention to my corrections of the redescriptions in the "Missouri Reports" of some of our common *Noctuidæ*. No specimens of these were submitted to me for identification, nor am I credited with such work in the reports. I determined *Agrotis scandens* in the first report as a new species, which at the time it was.

Acronycta populi of Riley is Guenée's *Lepusculina;* I made the correction in my earliest list (1873, p. 79). *Prodenia autumnalis* Riley is the corn-bud worm of Abbot, who figured the moth in all stages in the Insects of Georgia. It is figured under Abbot's name of *Frugiperda* also by Hubner. In the Bulletin of the Buffalo Society of Natural Sciences, vol. i, p. 81, this correction is made by me nearly ten years ago. *Xylina cinerea* of Riley is *Lithophane antennata* of Walker. I made this correction in the Bull. U. S. Geol. Surv. vol. v, No. 2, in 1879, assisted by Professor Fernald's identification of Walker's type in the British Museum. I am also of opinion, and have expressed it, that *Amphipyra conspersa* is an aberration of *Pyramidoides*. The identifications of *Subgothica* or *Jaculifera* in the same reports is incorrect, *Tricosa* being illustrated, at least in part (wood-cut). Also "Commelinæ" is not that species. The identifications of our *Noctuidæ* in the Missouri Reports are, generally speaking, unfortunate, and have been made without sufficient acquaintance with the group. Finally, I believe that *Brassicæ* will prove identical with the European *Ni*, and that it may have been introduced like the White Cabbage Butterfly. The peculiar structure of the male seems to be the same in American and European examples. Professor Riley is quite wrong in contradicting my separation of the West Indian and South American *Satellitia* from our *Philampelus pandorus;* my course is latterly approved by Butler, and Dr. Boisduval also considers the two quite different. I have, as early as 1872, in the Trans. Am. Ent. Soc., p. 28, discussed these mistakes.

Since the publication of the list of the species of *Botis* found in North America, Bull. U. S. Geol. and Geogr. Surv., 675, 1878, the following have been described:

Botis commortalis Grote, Can. Ent. 13,233, 1881. Havilah, California.
Botis oscitalis Grote, Can. Ent. 12, 36. Maine; Ohio.
Botis oppilalis Grote, Can. Ent. 12, 36. Maine; Massachusetts.

NOTE:—*Botis dissectalis*, described in the same paper, should be referred to *submedialis*.

Botis dapalis Grote, Can. Ent. 13, 17. California.
Botis lethalis Grote, Can. Ent. 13, 33. California.
Botis vacunalis Grote, Can. Ent. 13, 33. Sierra Nevada, California.
Botis turmalis Grote, Can. Ent. 13, 34. Colorado Rio.
Botis rufifimbrialis Grote, Can. Ent. 13, 34. Massachusetts.
Botis flavinotalis Grote, Can. Ent. 13, 34. Pennsylvania.
Botis annaphilalis Grote, Can. Ent. 13, 34. Havilah, California.
Botis capitalis Grote, Bull. U. S. Geol. Surv. 6, 272. Florida.
Botis fissalis Grote, Bull. U. S. Geol. Surv. 6, 273. New York.
Botis augustalis Grote, Bull. U. S. Geol. Surv. 6. 273. Colorado.
Botis toralis Grote, Papilio 1, 178. New Mexico.

NOTE.—In this same paper I have given a note on *Volupialis*, collected recently by Professor Snow in New Mexico.

BOTIS FLAVOFASCIALIS n. s.

Thorax and base of primaries olivaceous, shading to yellowish. Median field of primaries purple, bounded outwardly by the t. p. line, which is exserted over median nervules. Discal points not discernible without the glass; the reniform indicated by a darker mark. Subterminal space yellow. Terminal space purple, rather wide, of even width. Fringes blackish. Hind wing sub pellucid, pale, with fuscous terminal line and line at base of pale fringes. Beneath legs and body pale, the wings faintly reflecting upper surface. New Mexico, Prof. Snow, No. 876.

Expanse 21 mil. This form is easily recognizable by the clear yellow subterminal field, contrasting with the broad vinous terminal space and the purple median field projected over median veinlets; above the exserted portion of t. p. line the subterminal space is narrower. It resembles ***onythesalis*** in disposition of colors on fore wings, but the purple terminal field is wider; the hind wings are discolorous, the colors of primaries more intense, and defining clearly the separate fields of the wing. The colors are darker than in ***laticlavia*** or ***cinerosa***.

BOTIS WASHINGTONALIS n. s.

The shape is like *fodinalis*, apices produced subfalcate, pointed; bone white or soiled whitish, sprinkled with fuscous; wings broad. A fuscous apical shade; corta fuscous to reniform. T. p. line formed of little scallops, with a sulcation below median vein. A fuscous shade extending to costa over reniform spot. Anterior line angulate. A square, partly open spot just beyond the line and remote from the reniform, the orbicular. Preapical costal dots. A distinct series of terminal dots on both wings. Hind wings concolorous; an incomplete line, distinct beneath where is a discal point, and one beyond it, near the base and costa. Markings beneath distinctly repeated; the spots on cell of fore wings distinctly filled in with fuscous. Length of fore wing, 14 mil. Three specimens. Washington Territory. Mr. Morrison

Art. XX.—New Moths, principally collected by Mr. Roland Thaxter in Maine, with notes on noxious species and remarks on classification.

By A. R. Grote.

While Pennsylvania and its chief city, Philadelphia, hold classic ground which has witnessed the labors of the early writers in America on Entomology, such as Haldeman, the elder Le Conte, Melsheimer, and Say, Massachusetts and Boston are no less to be remembered, with Cambridge, where Harris collected and wrote. In fact most of the older States had their entomologist, not a "State entomologist," but some one who made himself felt in the then small but growing literature of our science during the first half of the present century. Randall in Maine; Kirtland in Ohio; Drs. Morris in Maryland, Fitch in New York, Leonard in New Hampshire, are instances that occur to one in writing. Nor will Jaeger, D'Urban, and Oemler be forgotten, or Peck, to whom Harris was indebted for early inspirations. From early sympathy, rather than association, I have belonged to the eastern circle of "enemies of the net." I have wandered along the lanes of Cambridge, about the university grounds and again walked the paths of Boston Common, beneath the elms, *sub tegumine ulmi*, before I grew to man's estate, and conjured up the figure of Dr. Harris studying *Ceratomia*.* I could never think of Dr. Harris as "furtively boxing" his captures. There was something quiet and earnest bound up with my idea of the man and his work, which precluded the notion that he cared for what might be thought, by passers-by, of his occupation. Yet he must have been unobtrusive, if not timid, by nature. Still less can I think of him armed, *cap-a-pie*, like the modern or English collector. I supposed then, and still think, that few noted his going and coming, on those walks which furnished facts for his letters to the Rev. Dr. Leonard or to Doubleday. He seemed to me to have been very different from Say, a slower and more careful man, equal to his state. An unattractive hero, perhaps, with the same conservative ideas as the mass of his fellow-townsmen. Yet, to me, he was greatly worthy of veneration, and I was undecided whether he were the more remarkable, or Thoreau by Walden Pond. Thoreau and his school stood outside of Evolution, and the Derivative philosophy of nature; and it surprises one that it should have been so. With his knowledge of the classics, it is strange that Thoreau overlooked Democritus and Lucretius. The facts all ran before his eyes, and he took them up singly, as the bit of sky on the blue-bird's back; but he went no further with his discovery. The New England blue-bird, or its Mayflower bloom, stood in relation with some fact that was true by the banks of the Ganges, for Thoreau. He fitted them into some eternities reflected from the Bhagvat-Gheeta; meanwhile they were fading with the season and fighting the struggle for-existence in the Concord woods. Nature has to be studied from small point to small point. Thus are the fine chains of reasoning made, which, presently, some one will cast over the Rocky Mountains and bring down a land-slide of results—so much of the world captured. Thoreau threw aside all his weapons and refused this world's fight. He was a poet of Nature because he did not understand Nature; she was perpetually strange to him. Matter was the miracle for Thoreau; Mind the every-day affair. He was satisfied when his thoughts had untied themselves and fled from the matter which gave them birth. He admired their tenuous appearance, far off and disappearing, following the doves behind the clouds. But meanwhile Dr. Harris was finding the curious larvæ with horn-like ridges on the thorax, which were feeding on the elm trees of the Common. He knew that this was a remarkable variation of the usually smooth Sphingid larval form, something "not in the books." He called the insect *Ceratomia*, and *put* it in the books, where it must stay for future generations to study over. This is some of the philosophy of facts that must be pursued to discover the succession in place and time. Thoreau stood aloof from it; by so much superior to the eternal procession, and yet by so much the loser and out of sympathy with humanity and the direction where its inquiry and progress were to lie.

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* The odd way in which "H", for "Harris," was afterward turned into a contraction for "Hubner," I have written about elsewhere. Dr. Clemens made no original compilation of the literature of the *Sphingidæ* in his "synopsis" of that family, and Dr. Morris only copies Clemens.

By a good many threads of thought Entomology attaches itself to general literature. I remember reading in Dr. Fitch's "Reports," his speculation that the "great caterpillar" of Indian tradition, sung of by Longfellow in "Hiawatha," was that of *Euprepia americana*, an insect now thought to be identical with the European *Caja*. But the description does not fit that species nearly as well as it does the black, hairy caterpillar, with its deep scarlet rings, of *Ecpantheria scribonia*. This is commonly found in the spring, pupating beneath logs and stones in May and June. If, indeed, we are to take the name literally, the strictly American genus *Ecpantheria* seems more appropriately to be noted; and, as its larva is, probably, the handsomest and most striking of its group, it would not unlikely catch the eye of the Indians.

I can fancy how long Entomologists will be glad that Dr. Harris lived, as I have every day since I knew it. It is not only his excellent English, his staid, unflippant style, that makes his "Report" so readable. It is the spirit of cultivated observation that pervades his page and makes it young and modern always. Perhaps not so much modern, as alive and quite well. Some of us are not so well, with the printer's ink hardly dry. Professor Riley finds some fault at my quoting Dr. Harris's original "Report"; but for all these reasons it is a favorite "Report" with me, although I do not think the descriptions of *Noctuidæ* in it are accurate enough, or full. As to this fact, the early descriptions are all scant, while the known kinds are still few.

The Eastern Entomologists are, I believe, all fond of Harris's memory, and he seems to have left behind him a good reputation. The Boston Society published his Correspondence, and this is very readable. From a scientific view the new names for Moths in it, all poorly founded, should have been omitted from the book. It was a mistake to publish them without the specimens at hand and some one to tell the editor what they now were to be called. The resurrected names, I fear, are not only past reviving, but past recognition.

My old leather-backed "Report" is now the book I most often take down, open, and read. I do not see what I could have done without it, when I only had the more gorgeous Flint edition. My copy was once Dr. Fitch's, and will be some one else's in turn. I hope my true kin, the entomologists, will keep it going from one to another down the coming years. It contains also the "Descriptive Catalogue" from Silliman's Journal. Dr. Harris has written the date, 1839, on its title page; an "extra" title page, evidently. It is an "Author's copy," bearing above, also in Dr. Harris's handwriting, "Asa Fitch, from the author." One of those "extras" which the Rev. Mr. Hulst appears to think does not constitute publication, as against the "number" of an amateur antedated. It is paged by itself, but on the reverse of the title, on the second page, Dr. Fitch (I think) has written: "p. 282, in Silliman's Journal, vol. 36."

As illustrating the uncertainty which one often feels, whether the position given to an aberrant form is the true one, I may cite a written remark, in my copy, to the description of *Psychomorpha epimenis*, on page 39. Dr. Fitch has written in ink over Dr. Harris's own words in lead pencil: "A Noctua, genus *Brephos?* (Harris's correction)." But we know that this is, in effect, no correction, and that the insect was properly named at first. Some time I may give more notes on this copy of Dr. Harris's "Report," &c. It is no wonder I am fond of the book. It is nicer than many of the later "Reports," which I occasionally receive, on its subject; although our information on "Noxious insects" is, to-day, so much fuller, more practical, and thus more valuable.

All specimens of Moths from the Eastern States bring up thoughts of Dr. Harris and, indeed, the great thinkers of the region whence they come. Undoubtedly the face of the country, its fauna, flora, and climate, influence its productions, its learned men among other. So there is nothing inconsequent in my digression, which I leave to consider the specimens before me, and which have been chiefly sent by my friend, Mr. Roland Thaxter, making part of his collections.

Ichthyura strigosa n. s.

♂ ♀. Allied to *americana* of Harris. The pre-apical stain is yellowish; the white mark curved and rather even and narrow. Lines much as in allies. This form is distinguishable by a succession of short blackish interspaceal dashes, situate subterminally; one, opposite the disk, extending backward to the middle of the cell, and two shorter, on the succeeding interspaces above it; there is also a blackish mark below, between veins 3 and 4. The dark fringes finely cut with pale. Hind wings fuscous. Beneath the blackish streaks reappear. They distinguish this form, of which Mr. Thaxter has reared several specimens, from larvæ found on Poplar, at Kittery Point, Me. The thorax is marked as usual in this genus.

Agrotis gularis Grote.

Mr. Thaxter has taken *turris* and *gularis* in *coitu*; thus my former suspicion that the ochery *turris* was only a variety of the dark red *gularis* is verified. The latter seem to be usually the males. Kittery Point, Me., and Newtonville, Mass.

Agrotis dapsilis n. s.

Whitish-gray. Forewings rather short and broad. Thorax thickly haired. Eyes naked. Forewings and thorax whitish-gray. Inner median line represented by black dots on the veins. Orbicular a minute dot. Reniform a narrow, blackish, curved streak. T. p. line dotted. S. t. space a little darker on costa; s. t. line a dark, faint, uneven shade. A dotted line before the pale fringe. Hind wings pale fuscous gray, with a darker fuscous shade band before the margin and faint mesial line. Beneath, hind wings whitish; forewings fuscous with obliterate markings. Florida; Mr. Thaxter.

Hadena misera n. s.

This species, with naked eyes and unarmed tibiæ, has a slight, discolorous, thoracic crest, and the dorsum of abdomen is feebly tufted. It has the appearance of *Perigea luxa*, but is smaller, more compact. Of the same fuscous color, dark, and with inconspicuous markings. The reniform moderate, discolorous, yellowish, the other stigmata hardly indicated. Lines lost, except the waved, rusty yellow subterminal. Costa dotted with pale yellowish. Hind wings nearly concolorous dark fuscous, paler than forewings. Beneath, fuscous; hind wings paler, irrorate, with dot and extra mesial line. The head, collar, and tegulæ, blackish fuscous, like forewings. Abdomen like hind wings. The disk of thorax somewhat rusty and paler. Illinois; also, I have somewhere seen a specimen from New York. Apparently not common. August.

Perigrapha transparens n. s.

♀. Eyes hairy. Tibiæ unarmed. Vestiture of the body rather shaggy. Abdomen untufted. Thorax with a ridge down the center. Head a little sunken. Apex of primaries sharp; outer margin lightly curving in below apices; full inferiorly. Russet-brown, somewhat thinly scaled on the wing. Forewings reddish-brown, nearly concolorous; reniform a vague black shade. Lines wanting. The veins are a little marked with black in place of t. p. line, and show exceedingly minute pale dots terminally. Hind wings subdiaphonous, fuscous. Thorax and head like forewings. Outline of *normalis*. Secondaries with the hind margin indented subapically; beneath with discal dot. The color beneath is uniform, reddish fuscous, with veins marked on both wings. Washington Territory. In my Collection. In form the relationship to the Californian *erythrolita* is evident.

Tapinostola orientalis n. s.

Size smaller than *Senta defecta;* wings narrower; apices somewhat blunt, yet determinate. Eyes naked. Abdomen (of the female) short and plump, untufted. Head close to the thorax, roughly haired; labial palpi somewhat dependent. Clypeus smooth. Forewings of the usual heliophiloid tints. Veins pale. Subcostal and median veins lined within on the cell finely with black. Submedian interspace above the fold pale yellowish. T. p. line indicated by a black dot on submedian fold, a smaller one between 2 and 3, and faint traces of others superiorly. A fine, black terminal line cut by the whitish nervules. Hind wings lighter at base, pale, with a light fuscous terminal shade; extra-mesial line indicated. Beneath, without markings, pale; a dot on hind wings; veins marked. Two specimens, Kittery Point, Me. Collection of Mr. Thaxter. This cannot be *variana*, on account of the dotted t. p. line.

Nonagria subflava Grote.

A specimen agreeing with my type, but a very little smaller, has been taken by Mr. Thaxter at Newtonville, Mass. My type is from Northern Illinois.

Scopelosoma moffatiana n. s.

This species, captured in the autumn on oak leaves by Mr. Moffat, of Kingston, I have formerly regarded as the same as *graefiana*. Mr. Thaxter thinks it is different and calls my attention to the following points: It is generally larger; more richly colored, being of a reddish-orange, while *grafieana* is yellow. The transverse lines are blackish, not red, and more uneven; the t. a. line arched in *moffatiana*. The hind wings are suffused with red in the new species, and I find that the mesial line is more even. Taken with *ceromatica*. Mr. Moffat has captured many rare Lepidoptera; among the Noctuidæ, I note especially *Arzama diffusa*. I have supposed that *moffatiana* was fresh, autumnal, *graefiana*, and figured it as such in my essay, incorrectly.

This discovery that the type of *graefiana* is the Fall form, and that it is always to be distinguished from *moffatiana* by its yellow ground color, red lines, which are also straighter and, perhaps, thicker, as well as the paler hind wings, leads me to recall all the instances where I have erred in my estimate of varietal characters in the group. I find that I have made almost as many mistakes one way as the other; thus I feel sure that there is not an overplus of "species" as the names stand in the books. There are a few varieties still held distinct in all probability, such as *gentilis* and *perbellis*, *evicta* and *vomerina*, but the proportion of such cases is very small indeed; and it must be remembered that even in Europe, where they have studied the fauna so much longer and more carefully, discoveries affecting the standing of certain forms are yet making.

Platysenta angustiorata n. s.

♂. Eyes naked. Body linear, narrow, slender; abdomen a little flattened, untufted. Front without projection. Labial palpi exceeding the head; second article squamose; third rather long with appressed vestiture. Wings silky. Forewings fuscous gray, darker terminally. A basal blackish dash below median vein. One on the cell before the small reniform, which consists of two black points ringed with pale. Lines wanting. Legs unarmed, concolorous with the rest of the appendages and body. Hind wings pale at base, with broad blackish terminal band. Beneath both wings with broad black borders. Colorado. This species cannot be a *Caradrina*, from the well-sized terminal article of the labial palpi. It is about the size of *atriciliata*, differing in color, but like it in the ornamentation, or rather want of it. I cannot believe that Guenee's *videns* is *atriciliata*. The insect is like a *Caradrina*, but not agreeing with *Leucania*. The slender form, naked eyes, etc., should prevent any idea that in *Platysenta* we have to do with a noctuid related to *Heliophila*. It will, I think, be found that the genus comes nearer to *Caradrina* than any other.

Anchocelis digitalis n. s.

Size small. Wings entire; apices pointed. Head, sunken, hairy. Eyes naked; strongly lashed; somewhat ovate or narrowed. Tongue not as strong as usual. Front with a transverse elevation. Legs with the tibiæ unarmed, pilose. A neat, compact noctuid, with the ornamentation not unlike *Tæniocampa modifica*. Bright brown. The median space darker, contrasting, v-shaped, confined by the two pale, narrow, even, median lines, converging to internal margin where they nearly meet; stigmata obsolete. The reniform alone discernible; figure-of-8 shaped, made of two dark spots, annulate with pale. The wings are a little silky. Hind wings blackish, with paler, brownish fringes. Anal tuft brownish; beneath paler, with double common lines and discal marks on both pair. Orono, Maine; Mrs. Fernald.

This beautiful little noctuid differs in the pointed primaries from the genus *Anchocelis;* it agrees in the naked, lashed eyes, and in having a clypeal protuberance. It is related to the genera about *Tæniocampa*. The body is rather shaggy, the thorax is straight-haired, and there seems to be a slight tuft behind the collar. While the clypeal projection does not accurately correspond to the structure of *lunosa*, as given by Lederer, still I know of no genus where the bright-looking and distinctly marked species is better placed for the moment. The abdomen is not tufted; it exceeds the hind wings. The antennæ are simple, ciliate. The absence of all distinct lines or marks on primaries, except the two median lines inclosing the darker V-shaped median space, should make the species easily recognizable.

Plusia surena n. s.

Allied to *ampla* and *epigæa*. No reddish or brown stains. Fore-wings whitish gray and black, silky; t. p. line rivulous, without prominent indentations. Metallic mark an open V; the outer limb a little uneven, silvery, narrow, surmounting a black patch or shade filling the median field below. S. t. line preceded by a black shade, a little irregular, black. Reniform upright, black-ringed, not constricted. Orbicular small, oblique, finely ringed. Hind wings yellowish fuscous, rather pale, with a moderately broad terminal band. Thorax gray. Orono, Maine; Mrs. Fernald's collection.

I am much indebted to Mrs. Fernald for specimens of moths from the neighborhood of Orono, collected with great care by herself. The fauna of Maine is of exceeding interest. Not only is it the home of three such rarities as *Platysamia columbia*, *Eusmerinthus cerisyi*, and *Catocala coelebs*, but several species occur there originally described from the Pacific coast, such as *Agrotis atrifera* and *Botis fodinalis*, while *Syneda alleni* has been recently again described from the West as *saxea*, as Mr. Hy. Edwards informs me. Space does not allow me to write further on the subject, but local lists from Orono will be among the most interesting from any locality, as is evident from Mrs. Fernald's captures, upon whom the occupation of the entomologist sits charmingly.

The families of Moths catalogued in my "New Check List" I am disposed to consider of equivalent value, yet the tendency among students of the suborder has been to increase the number of family groups. It must be admitted that the lower subfamily (*Glaucopes*) of the *Zyganidæ* is closely allied in structure to the *Arctiidæ*. The errors of Dr. Boisduval and myself in certain instances show the fact. In the larval state Dr. Packard has discussed the points in which *Ctenucha* approaches *Arctia*. The effect of limiting the family groups by certain single characters has led to the breaking up of the *Bombycidæ* into family groups, which destroy the unity offered by points of form. We have now such speculations as that of Mr. Butler to consider as to the affinity of *Cossus* with *Castnia*. For my part, while I strongly urge the importance of founding the genera on absolute characters of structure, I would be led by considerations drawn from the criteria of rank in Hexapoda in deciding the relative position of family and subfamily groups. The long and heavy abdomen is decisive, I think, of the low position and mutual relationship of *Cossus* and *Hepialus*, within the *Bombyces*. We have surviving in this group a number of types now comparatively isolated; in arranging them we must be governed by general considerations of this kind. The relationship is net-like, and the survival is unequal. The Notodontians may be held to be nearer the *Noctuidæ*, but I should not arrange them last on this account; if, by position, we indicate a higher or lower structure, we are bound to finish the *Bombyces* with the *Hepiali*, with naked larvæ and short antennæ in the moth. Nor can I, on account of the hairy larvæ, place any of the Apatela-like genera of the *Noctuidæ* among the *Bombyces*. I have explained the characters which have influenced my arrangement of the genera of *Noctuidæ*. There is a general tendency in the increasing breadth of wing and common coloring of both wings towards the Geometrid type. To a certain extent the sequence is broken by the Deltoids. Yet the higher genera of this group are not separable by structure from the lower forms of the *Fasciatæ*. It needs only the comparison of *Homopyralis* and *Pseudaglossa* to show this. On the other hand, the limit between the lower Deltoids and the *Pyralidæ* is difficult to define; certainly, I have been puzzled to locate such a genus as *Dercetis*. The neuration must guide us; yet how uncertain this character often is, has already been felt by observers. The result of my own studies has been to insist on the present sequence of the families, interpolating the *Geometridæ* between the *Noctuidæ* and *Pyralidæ*. As to the genera, I would keep the Apateloid genera in the *Noctuidæ;* from which family I think it also unadvisable to separate the *Cymatophorina* of Herrich-Schaeffer. In studying a species with the view of locating it in any family, we must be guided by the relative form and, as shown by Dr. Packard, the *facies*, in addition to the balance of single structural features. Such consist in the structure of the eyes, antennæ, mouth parts, neuration, and genitalia; the presence of ocelli, the character of the vestiture, the pattern of marking and color must be ascertained. After all this, a certain tact, which is the result of experience, must be depended upon to successfully place the species. A special discussion of the different forms catalogued by me would be too lengthy and out of place. I would merely endeavor to interest the reader and lead him to investigate the many questions which are not finally answered. The time is coming when our classifications will be greatly influenced by a knowledge of extra-limital forms. The student of a group as represented throughout the globe must be relied upon to place correctly the species in a single fauna. For this reason MM. Boisduval and Guenée have been, and now Mr. Butler and Professors Speyer and Zeller are, in the best position to give a weighty opinion. The *Sphingidæ* of the world in the cabinet of the British Museum afford their describer many facts which influence the arrangement of the North American species. It was not without a survey of this and other large collections that I adopted the present arrangement of our forms. I was glad to find that our earlier Synonymical Catalogue offered main points which Mr. Butler could accept, when he considered the Sphinges from all the continents.

Of the few changes made in my "New Check List," I find space to notice my reference of *Crocota* to the *Arctiidæ*, based on the presence of ocelli and the structure of the larva described by Mr. Saunders. Again, Dr. Bailey has drawn attention to the characters of *Cossus centrensis;* in doing so the structural differences offered by *robiniæ* become apparent, and justify a different name for that species and allies. In the *Sphingidæ* I have taken Dr. Boisduval's term for our genus, of which *gauræ* is the type, Mr. Butler having shown that *Proserpinus* is untenable. If we divide *Sphinx*, as now restricted, we may use Hübner's terms *Lethia* and *Agrius*, for which, in my list of 1873, I have proposed types included by Hübner. But it seems to me difficult to find sufficiently strong characters, and I have left the genus undivided, with *ligustri* as type. The European *convolvuli*, on the other hand, I would refer to *Phlegethontius*. The changes in the *Noctuidæ* have almost all been made originally in other papers. I have reduced the number of species and genera as much as possible. Both the moth of *Platycerura* and the larva, observed by Mr. Thaxter, offer characters which appear to me to warrant its location with the *Bombycoid Noctuidæ*, such as *Charadra* (an American genus distinct from the European *Trichosea ludifica*, and *Audela*, and not with the Notodontians. On the other hand, *Edema* seems to me to be decidedly a Bombycid, although it has been suggested that it belongs to the *Noctuidæ*, by European authorities. Among the curious resemblances between the lower *Zygænidæ* and the *Arctiidæ* is the similarity between *Ctenucha* and *Euchætes*. The stone-gray or mouse-color of the wings of the darker *Euchætes* forms, such as *egle*, recalls *Ctenucha*, and the red stripes of *Spraguei* and the yellow of *abdominalis*, though not similarly placed, remind one of the ornamentation of certain forms of *Ctenucha*. It is owing to a coincidence of outline and color that I believe I made an error in describing *abdominalis* as a Zygænid, a good many years ago.

The study of the *Noctuidæ* gives important hints as to the derivation of species, to which I have called attention by the method of variation between "representative" species, and the fact that the larval stage affords evidence here and there of independent modification. The larvæ of *psi*, *tridens*, and *occidentalis* all differ, while the moths are much alike and, perhaps, cannot be separated always with certainty; yet the American form differs apparently a little more than do the two European ones, occupying the same territory, from each other. All cases of imagos differing but slightly must be held as showing a closer relationship, a nearer epoch of disintegration in time, than is expressed by generic association. We have no name for such groups of individuals, intermediate between species and varieties, not forming *genera*, as we now understand genera to depend on similarity of structure alone. As usual, in a multiform and plastic group, like the *Bombyces*, whose blood we can trace in groups like the Glaucopidians, which we now separate from them, the difference having grown to be a large one, we shall find more clearly proofs of such a condition of groups of individuals. I propose to call them *Progenera*. An example is, for instance, *Dutana*; also *Ichthyura*, *Nadata*, *Clisiocampa*, *Orgyia* (and *Eucronia* as a division of *Hemileuca*, if we are obliged to admit *Neumœgeni* into *Hemileuca*, as I believe). Other instances will occur to the student. The species of such *Progenera* stand in a nearer connection than usual; with some of the forms the interbreeding may not have become suspended. In the butterflies *Grapta* and *Basilarchia* (I use this term for the American *Eros*, *Arthemis*, *Proserpina*, *Ursula*, *Dissippus*, excluding the Californian forms, and thus, perhaps, as a division of *Liminitis*) are instances of Progenera. *Subgenera* are smaller assemblages of species in a genus, agreeing in some minor peculiarity of structure. They are not groups of coincident forms varying less among themselves than is the rule with "species," while yet not "varieties," being more distinct and true. In the study of such groups, particularly in that of *Basilarchia*, as I have elsewhere pointed out, lie immense possibilities in the direction of ascertaining the causes of so much diversity in the *Lepidoptera*.

INSECTS INJURIOUS TO VEGETATION.

Eugonia subsignaria Hübner.

This whitish Geometrid used to be so common in Brooklyn, when I went to school there in 1857 and subsequently, that the horse-chestnuts, elms, and maples, the latter especially, became completely defoliated, and the brown measuring worms used to hang down and cover the sidewalks, ultimately to the great discomfort of the passers by. I have seen ladies come into the house with as many as a dozen of the worms on their skirts and crawling over their clothes. Nervous persons were much frightened in discovering the disagreeable-looking but harmless caterpillar on their garments. At the same time the worms of *Alypia 8-maculata* and *Thyreus Abbotii* were very common on the grape vines. Also the larvæ of *Deidamia inscripta*, *Eudryas unio*, and *Chamyris cerintha* were common. In New York, as well, some trees about the old Post-office, on Nassau street, were similarly affected by the larvæ of *E. subsignaria*. The advent of the English sparrow changed all this. The naked brown larvæ of *subsignaria* disappeared before them. Gradually all the other naked larvæ became scarce or disappeared. *Orgyia leucostigma*, with its hairy uneatable larvæ, became more common. In Buffalo, where this was always common and the naked larvæ were rare or unknown, the English sparrow did no good as a destroyer of the caterpillars on the city shade trees. When I lived in Amity street, Brooklyn, about 1859, I remember to have found on our small grape vine, in the contracted back yard to the usual brown-stone house, the larvæ of most of the species here mentioned, as well as *Everyx chœrilus* and *myron*, so plentiful was insect life before the English sparrows came. *Thyreus Abbotii* was so common that its large larvæ could be found almost by the hundred. The native birds were undoubtedly diminished by the attacks of domestic animals and boys, to allow of such a multiplication of caterpillars. I think those were golden days for the Lepidopterists, looking back on them now. How much their brightness in retrospect owes to other causes, in my own case, is a matter of trite philosophical inquiry and conclusion.

LARVÆ AFFECTING THE PINE.

Citheronia sepulcralis Grote.

This large moth was found on the yellow pine, in the larval condition, by the late Mr. James O. Treat, in Massachusetts. On an unpublished plate, painted by Abbot, the moth is represented, but not the earlier stages of the insect. This plate is in the British Museum Collection. The moth has been reared in numbers by Mr Koebele in Florida. In all stages it is as distinct from *regalis*, as any two forms in one genus can possibly be. I notice it here, to correct a remarkable statement by Dr. Packard in his excellent and very useful Report on Insects injurious to Forest and Shade Trees, that it may be a variety of *regalis*. It has been found not uncommonly about Atlanta, Ga., and, I believe, on small persimmon bushes as well as the pine. Specimens reared by a collector there, were forwarded to a well-known collector of Reading, Pa. There can be no doubt that the species are abundantly distinct. I collected a very few *C. regalis* larvæ about Atlanta on the cotton plants. The two larvæ differ on comparison; that of *regalis* is differently colored, larger, and with longer horns. In my opinion there is no doubt of their distinct character.

Tetralopha diluculella Grote.

This species infests the terminal twigs of the pine in its larval state. Professor Comstock gives a description of the larva and pupa collected in Florida on *Pinus tæda*. The insect is found as far north as New York. I have given a scientific sketch of the group to which I refer this species and its genus. It is a new subfamily of *Pyralidæ*, which I call *Epipaschiæ*, after the typical genus founded by the late Dr. Clemens. It is chiefly characterized by a basal tegumentary extension to the male antenna.

Pinipestis Zimmermani Grote.

I have described the larva and moth of *Pinipestis Zimmermani*, Grote, in the Bulletin of the Geological Survey, Vol. IV, No. 3. The genus may not be distinct from *Dioryctria;* but the European moth has not the raised scales on forewings, and the neuration varies somewhat. I dug out from pine trees these larvæ in the winter; and at different times Mr. Zimmerman, of Erie County, New York, who first drew my attention to the insect and for whom I named it, brought me specimens.

These were pinkish compared with the larvæ I found in June beneath the gummy mass of exuded sap, and which pupated in July. I could not carry the winter larvæ through, but they are undoubtedly the same species. Professor Kellicott, I believe, at first doubted this, but afterwards came to my original opinion. The species is, then, single brooded. It is very destructive and spreads in nurseries among imported pines. As it affects the branches and is protected by the gum, I do not think that anything can be done except digging the larvæ out with the knife, which is tedious and, except under peculiar circumstances, an unprofitable and difficult process.

LARVÆ AFFECTING THE HICKORY.

Phycis caryæ Grote, Papilio I, 13.

This species was discovered by Mr. Coquillett, of Ill. The larva burrows into the branches of the pignut hickory, *Carya porcina.* "The larva spins a thin web around the footstalks of the leaves which grow near the terminal end of the branch, and then burrows into the terminal bud and wood of the first year's growth."

Phycis angusella Grote, North Am. Entomologist I, 51.

This species has been reared from larvæ boring into the leaf-stems of the hickory on Long Island by Mr. Akhurst. The specimens of the moth which I have examined proved to be all males. It may be known by the continuous black dash on the under side of hind wings along costa. I use the typical generic term *Phycis* of Haworth for the species formerly separated under *Acrobasis.*

Phycis demotella Grote, Papilio I, 14.

This moth, of which I only know the male, and not as yet the larva, has a shorter black mark on secondaries beneath, not connected with base of wing, and a narrow streak on median vein. Head and thorax pinkish white, as also base of wings. Taken with *angusella* at West Farms by Mr. James Angus. I think the larvæ feeds on Hickory.

LARVA AFFECTING THE LOCUST.

Salebria contatella Grote.

This species was bred from larvæ found on *Robinia pseudacacia*, in the Department of Agriculture grounds at Washington. It draws the leaves together, the side of one to that of another, according to Professor Comstock, in whose valuable report for 1880 an account of the insect will be found, p. 261, *et seq.* The variety 5-*punctella* was also bred from the same larvæ. This variety seems to arise, as I have stated, by the outer line of the t. a. line, becoming resolved into dots. My figure, in the Am. Ent., is the least exact on the plate, the figures on which, otherwise, were accurately transferred to the stone and finely engraved upon it.

LARVÆ AFFECTING THE CABBAGE.

Plusia dyaus Grote.

This species has been reared from larvæ found on cabbage. I have seen no account of it, however. I believe it will be found on other plants more commonly and not principally on cabbage like *Plusia ni*, a European form of peculiar structure, which I think may have been introduced into this country much as the White Cabbage-butterfly. Although the American specimens have been described as distinct, I regard them as the same as the European species.

Botis repetitalis Grote.

Specimens of the larva of this species were received by Professor Comstock, when Entomologist to the Department of Agriculture, from Dr. A. Oemler, of Savannah, found feeding on cauliflower. It is described on page 270 of the report for 1880, which latter is one of the finest and most scientifically valuable documents ever issued by the department, of which I have any knowledge.

Geometridæ.

After comparing European specimens with our own, I have made the two following changes in our lists:

Glaucopteryx Inventaraia, Gr.

Gl. Cæsiata ‡ Butler, Papilio I, 222.

Scotosid Indubitata, Gr.

Sc. dubitata ‡ Harvey, Bull. Buff. S. N. S. I., Pl. XI, fig. 7.

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